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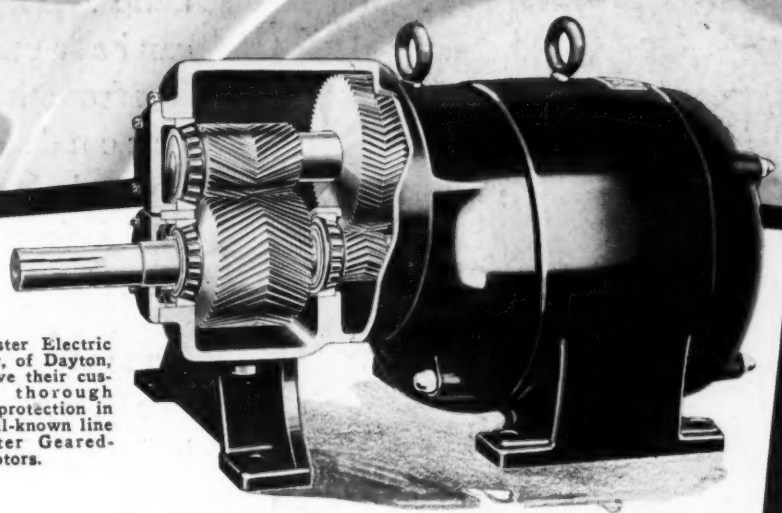

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ELECTRICAL WORLD

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October 8, 1932

Insulls Are Indicted in Chicago; Extradition Is Sought

THREE INDICTMENTS separately and jointly holding Samuel Insull and Martin Insull on charges of embezzlement and larceny through the abstraction of a total of $514,942.74 from two financing companies of their system to support a marginal stock market account maintained by Martin Insull have been voted by the Cook County grand jury.

The first indictment names Martin Insull alone, charging that he abstracted by means of embezzlement, larceny, and larceny as bailee, $344,720 from the treasury of the Middle West Utilities Company.

The second indictment charges Samuel and Martin Insull jointly with using $66,000 of the funds of the Middle West Utilities Company.

The third indictment names the brothers jointly on a charge of abstracting $104,222.74 from the treasury of the Mississippi Valley Utilities Investment Company.

In the indictments it is charged that the Insulls "fraudulently did convert to their own use goods, funds, money and property" and that they "did feloniously steal, take, carry away said personal goods, funds, money and property."

"It is now up to the county board to say whether the Insulls should be extradited and prosecuted," State's Attorney Swanson said. "I have done my duty; it is up to them to do theirs."

He estimated that the cost of extradition would be about $10,000.

State authorities have notified the prosecutor that extradition would depend upon assurance that the county would pay for the proceedings. The county board has twice refused funds to defray expenses of the Insull case.

Only two of the officers of Insull Utility Investments, Inc., have been available for questioning in the hearings to discover assets, P. J. McEnroe and John F. O'Keefe. In their examination of these men, vice-president and secretary-treasurer respectively, the lawyers for the creditors have sought to show that cash disbursements were paid on preferred stocks with funds from capital, a violation of the Illinois securities statutes that would make the directors liable.

Marshall E. Sampsell, former Insull executive, has told State's Attorney Swanson of a second loan which he contracted while president of the Central Illinois Public Service Company. He placed full responsibility for his actions upon Martin J. Insull, who, so far as he knew, had no authorization for it from any board of directors.

Discovery of the first loan, involving his withdrawal of $400,000 in preferred stock of his company from the company vaults to meet a personal bank obligation, forced his resignation some time ago as president of the company.

Another privilege list

In the federal court a list has been disclosed naming 250 politicians, financiers, utility officials and other prominent persons who formed a syndicate to purchase 115,000 common shares of Insull Utility Investments, Inc., now in receivership, at $50 a share on August 15, 1930, when the market price was $59.25. The syndicate members made initial payments of 5 per cent and were called upon later for 15 per cent more of the purchase price, all of which they lost when the syndicate liquidated.

That the various Insull investment or holding companies which have collapsed recently are not public utilities and hence not under the jurisdiction of the Illinois Commerce Commission, which has supervision only over public utilities actually operating, is claimed in a statement issued by the commission.

"Actual operating companies of the Insull group are public utilities, however, and are under the commission's jurisdiction," the commission points out, stating "with this thought in mind, the public should consider the fact that no one of the actually operating Insull electricity and gas companies is in receivership. All are operating. They are all solvent and financially sound. There has been no default on their bonds."

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Pennsylvania Commission Appointments Made

Clyde L. King will be the new chairman of the Pennsylvania Public Service Commission, according to an announcement made by Governor Pinchot last week. The Governor several weeks ago appointed King and P. S. Stahlnecker, his private secretary, to two vacancies on the commission, effective October 1.

Since the forced resignation of the late W. D. B. Ainey as a member of the commission last August, S. Ray Shelby has been acting chairman of the body.

Commission inquiry nears

Oliver K. Eaton, Assistant District Attorney from Pittsburgh, has been chosen as chief counsel in the investigation of the Public Service Commission. John G. Hervey, the associate dean of Temple University Law School, has been selected by the Senate committee to aid in drafting a new code for regulation of the utilities and to assist in the probe. The investigating committee met last week in Harrisburg and an-

nounced the appointments, which have not as yet been formally accepted by the appointees.

The investigation resulted from Governor Pinchot's charges that the commission is the "catspaw of the utilities," and permitted utilities to levy and collect "exorbitant rates" for services. It also followed his disclosures of several months ago that the late William D. B. Ainey, former chairman of the commission, apparently accepted favors from utility officials (ELECTRICAL WORLD August 20, page 225).

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New Hampshire Court Backs Associated Subsidiaries

Appeals of the New Hampshire Gas & Electric Company and the Derry Electric Company, units of the Associated Gas & Electric System, from orders of the Public Service Commission issued in June, 1931, were sustained in a unanimous decision handed down by the New Hampshire Supreme Court on Tuesday of this week. The opinion was written by Judge L. P. Snow and in a 30-page finding declares that the issues of law presented involve the single question of the extent of the commission's powers. The court sustained the appeals on the ground that the orders were unauthorized, declaring that none of them pertained directly to the regulation of rates or service. The court found, however, that if the commission's primary findings and rulings, on which the orders are based, are well founded, the appealing companies are subject to procedure against them by the Attorney-General of the state through the Superior Court. The court held that the Legislature would have used more explicit terms if it had intended to grant a general jurisdiction to make enjoining orders to a tribunal which has a roving commission to institute proceedings, formulate the charges against the utility, direct the prosecution and hear and decide the issues in disregard of the usual rules of evidence.

The orders from which the companies took appeal directed that the New Hampshire Gas & Electric Company pay no more money to the J. G. White Management Corporation until the management contract be approved by the commission; that the company discontinue the practice of selling appliances from the Associated Appliance Corporation; that it furnish no more storage space for these appliances without adequate recompense; that employees of the New Hampshire companies forthwith stop selling securities of the Associated Gas & Electric Company; that the Portsmouth company cease doing business in the Derry territory until authorized by the commission; that it strike from its books all evidence of obligation as a result of the purported acquisition by it of the Derry company; that it pay no more sums either in interest or principal on these obligations until sanctioned by the commission, and that the books of the companies be kept in New Hampshire. All of the common stock of the two New Hampshire companies is held by the New England Gas and Electric Association.

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Mercury Power Station at Schenectady Progresses

When completed and ready for operation early next spring this $4,000,000 power house at the Schenectady works of the General Electric Company will be the first outdoor steam generating plant ever built and will also represent a pioneering endeavor to co-ordinate utility and industrial power needs. The electrical output will be fed into the commercial system of the New York Power & Light Corporation, while the steam output will be used in G. E.'s manufacturing plant. As part of the system a 20,000-kw. mercury boiler and turbine will be used to produce kilowatt-hours at an unusually low cost.

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Security Commissioners Told of Need for Federal Control

Federal regulation of utility securities was advocated by George C. Matthews, director of the securities division of the Wisconsin Public Service Commission in an address at the convention of the National Association of Securities Commissioners last week. Condemning as unjust to industrials the discrimination by several states in exempting utility securities from provision of their blue sky laws, Mr. Matthews stated that it is time to re-examine every exemption in the state laws and that the presumptions in favor of utility securities, foreign government bonds, securities of banks and even of many municipal issues need to be considered in the light of experience in present conditions. "Many of the most flagrant abuses of the high credit position," he asserted, "have developed in the field of the holding companies, particularly those of recent creation or which have expanded rapidly in recent years, but operating companies have by no means been exempt."

Problems of the new price levels

"Utility properties as we know them," said Mr. Matthews, "have been built largely during the period of high prices. That was the natural situation. Expanding prosperity and high prices brought about demands for utility service. If the doctrine that cost of reproduction is largely to govern in valuation for rate purposes is to hold true in times of declining prices, as it did in cases which were contested when prices had gone up to high levels, utility securities may be seriously affected by that fact."

The sale of installment securities as practiced by some of the large public utility companies was condemned by Carl Newcomer, Kansas Commissioner, at one of the sessions of the convention.

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Receiver for Central States Edison

Fred J. Young of New York and Ivan Culbertson of Wilmington have been appointed receivers for Central States Edison Corporation by the Chancery Court in Wilmington, Del.

Boards of Examiners Meet; Registration Advancing

The National Council of State Boards of Engineering Examiners met in New York September 29 and 30. Delegates from sixteen of the 26 state boards were in attendance. Several important reports were made and policies adopted. It was voted unanimously to participate in the newly organized National Council for Engineering Development, composed of major professional engineering societies. This new council was formed to deal with four aspects of engineering: (1) Selection of students for engineering colleges; (2) study of engineering courses in the colleges and an endeavor to fix a list of accredited colleges; (3) supervision and aid in the training period of engineers, and (4) certification for professional engineers.

A report on accredited engineering colleges presented by Dean P. H. Daggett was referred to the National Council for Engineering Development for consideration. President D. B. Steinman stated that more than 40,000 engineers have been registered and that several more states contemplate the passage of licensing laws. A model licensing law has been prepared with the aid of professional engineering societies and this is being pressed to secure uniformity in legislation.

As a part of the work to expedite the work of examiners a bureau of engineering registration was formed last year. Upon payment of a small fee any engineer may be investigated and may receive a certificate of qualification which it is hoped will aid the licensing boards in determining his fitness. About 90 engineers have availed themselves of the facilities of the registration bureau. Resolutions were passed to expedite and facilitate the work of this bureau during the coming year.

At a banquet on Thursday night a silver scroll was presented to President D. B. Steinman in appreciation of his work for engineers. Addresses were given by T. C. Desmond, J. H. Cohen, Dr. Frederick B. Robinson and D. B. Steinman. Mr. Steinman outlined his ideal program for engineers to follow, embodying the following points among others: Selection and enrollment limitation of engineering students, specification of cultural and technical education, determination of accredited schools, guidance through training periods of graduates, specification for engineers as professional men, legal fixation of qualifications and restrictions, use of enforced legislation to advance the standing of the profession, a recognition of engineering as a single organized profession, unification of engineering organizations, elimination of free services and fee competition, increased compensation and more participation in political and social affairs.

Progress reports of the several committees showed that the movement toward engineering registration was on the increase and that greater uniformity and co-ordination is being had in practices.

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Clarion River Brief Filed by Department of Justice

A brief opposing the granting of a petition by the Clarion River Power Company (ELECTRICAL WORLD, September 10, page 325) for a review by the Supreme Court of the United States of a decision by the Court of Appeals of the District of Columbia in a case against the Federal Power Commission has been filed by the Department of Justice.

The department in a statement explaining the issue involved contends that the "result of the decision is correct, there is no conflict with any other decision and the petition should be denied."

In its brief opposing the granting of a writ for a review of the case the Department of Justice, among other things, says: "None of the questions concerning the powers of the Federal Power Commission are properly presented because there is no basis for the equitable relief sought or any other relief. Even if the case were not premature the objections to the authority of the commission could not be considered substantial."

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N.E.W.A. Defines Wholesaler's Industry Place

Bright hopes for the future, brighter than at any time in the past two years, were expressed by the more than 200 delegates who attended the 24th annual convention of the National Electrical Wholesalers' Association in Buffalo last week.

Industrial rehabilitation and the modernizing of commercial and apartment buildings were pointed out by B. W. Clark, chairman of the executive committee, in his opening address as offering outstanding opportunities for the immediate future. Speaking on "Opportuniites in the Field of Air Conditioning," John M. Bickel of the merchandising department of the Carrier Corporation expressed the belief that the dealer or distributor who would be successful in this field would be one whose organization was experienced in both heating and refrigeration.

Walter J. Drury, eastern district manager Graybar Electric Company, New York City, was elected chairman of the executive committee for the ensuing year and Henry J. Baitenger, Baitenger Electric Company, New York City, was made vice-chairman.

The electrical wholesalers' position in the industry was defined in a statement adopted by the convention. It is pointed out therein that, based upon the knowledge that the electrical wholesaler is an integral part of the electrical industry because of the economic service which he performs, he conceives it to be his duty:

To maintain and warehouse an adequate stock of standard commodities to supply his trade.

To maintain a showroom properly to display commodities for the benefit of the trade.

To maintain delivery service and facilities for pick-up service.

To maintain a selling organization trained to promote, specify and quote on electrical commodities, and properly to handle matters of service or misunderstanding with customers.

To be prepared to furnish a great variety of electrical commodities in one order at a minimum of cost and with greatest convenience to the trade.

To advise the trade regarding the most suitable and reliable commodities to purchase and install.

To distribute catalogs showing and describing the most essential items in common use in the industry.

To extend justified credit to the buyers within his territory upon reasonable terms.

To maintain a repair and replacement service to supplement the facilities of the manufacturer and the retailer in the handling of defective commodities.

Trade Indicators Steady; Markets Too

TENACIOUSLY holding the gains already made in spite of some softening here and there, the indicators of business show encouraging resistance to the uncertainties of pre-election waiting. Electrical energy production continues to rise, indicating something better than seasonal strength to be evident. Car loadings are still on the up and up. Security markets and commodity prices, which have wavered for some weeks, appear to be at about resistance levels.

Overseas developments will probably assume renewed importance with the passing of election day, regardless of who may be selected as our next chief executive. Diplomats are rather keen about associating with the winner. Grand stand pyrotechnics will bear a brief postponement.

The specters of unavoidable relief appropriations and of a national budget balanced only in fancy haunt the corridors of Washington and will do as much for some about-to-be-newly-elected congressmen.

Coming Meetings

Association of Electragists International—Kansas City, Mo., Oct. 10-12. L. W. Davis, 420 Lexington Ave., New York.

American Institute of Electrical Engineers—Middle Eastern District Meeting, Baltimore, Md., Oct. 10-13. H. H. Henline, 33 West 39th St., New York.

Pacific Coast Division, N.E.L.A.—Engineering section, San Francisco, Oct. 19-20. K. I. Dazey, 447 Sutter St., San Francisco.

National Association of Railroad and Utilities Commissioners—Hot Springs, Ark., Nov. 15-18. James B. Walker, 270 Madison Ave., New York.

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Outside Control of Utilities Hit by Missouri Court

That the order of the Missouri Public Service Commission granting a foreign corporation authority to acquire more than 10 per cent of the capital stock of a Missouri utility was unlawful is the decision of division number 2 of the Missouri Supreme Court in the City Utilities Company case. The latter, a Delaware corporation, sought to increase its holdings in the St. Louis Public Service company.

Under Missouri laws, a foreign company must obtain permission of the Public Service Commission before acquiring more than 10 per cent of a Missouri utility. The decision is regarded as a severe blow to out-of-state utility holding companies.

The city of St. Louis and some of the stockholders of the St. Louis Public Service Company appealed to the Cole County Circuit Court against the commission's order, but lost there and appealed to the Supreme Court.

Stanley Clarke, president of the St. Louis Public Service Company, stated: "The company's position is one of unconcern regarding who has stock control. As this stock control was voided about two years ago, it seems to me the decision is meaningless."

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Northwestern Electric Halts Oregon Commission Order

Contesting the recent order of the public utilities commissioner of Oregon reducing the rates of Northwestern Electric Company, Portland, Ore., suit has been filed in the U. S. District Court by that company asking for an injunction setting aside the order which was to have been effective October 1. A temporary injunction was granted September 30.

In its petition to the court the company alleged that the commission's valuation of the property in the Portland district of $9,500,000 was, in fact, $2,500,000 short of a reasonable valuation for this property; that the rate reduction ordered would reduce earnings by $150,000 per year, thus bringing about a return of less than 6 per cent on the fair value of the Portland property, and that this would result in the confiscation of $2,500,000 of property without just compensation and in violation of the Fourteenth Amendment to the Constitution. It was also alleged that the commission's order interferes with reasonable and efficient management by the trustees and officers.

The order in question reduced rates for residential service approximately 16 per cent; commercial service, 9 per cent, and commercial power, very slightly. It also ordered certain intangibles amortized out of the rate base and disallowed certain donations to civic enterprises and charities as operating expense. The general supervisory fee paid to Electric Bond & Share Company was also disallowed (ELECTRICAL WORLD, October 1, page 421).

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Anniversary of First Hydro Celebrated at Appleton, Wis.

On September 30, 1882, at Appleton, Wis., on the Fox River, a hydro-electric power plant, generally conceded to be the first commercial enterprise in which water power was used for the generation of electricity, was placed in operation. This plant was capable of lighting 250 16-cp. lamps.

This year the 50th anniversary of the opening of this station was celebrated coincidentally with the meeting of the electric section of the Wisconsin Utilities Association at Appleton. In cooperation with the Wisconsin Historical Society and Henry Ford a replica of the early power plant was exhibited and reproductions of the original generator and lamps were on view.

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Hurricane Injures Lines, Not Plants, in Porto Rico

Though a devastating hurricane swept across the island of Porto Rico last week, wrecking property of various kinds, electric light and power enterprises suffered relatively little.

According to F. Krug, vice-president and general manager Porto Rico Railway, Light & Power Company, the hydro and steam plants of the company were undamaged, though 25 per cent of the transmission and distribution lines of the organization were down. Partial service to San Juan for hospitals, food supply, refrigeration and communication was first restored, then San Juan city aqueduct supply lines.

The government system and the private plants at Ponce and Mayaguez were practically undamaged, not being in the direct path of the storm. According to Mr. Krug the wind velocity was 120 miles an hour for more than two hours where the storm struck.

Utility Appraisal System Outlined for Commission

Methods of appraising utilities controlled by the Pennsylvania Electric Corporation were outlined before the Federal Trade Commission by Examiner O. C. Van Zandt at a hearing last week. He testified that an engineering company controlled by the Associated Gas & Electric Company, of which the Pennsylvania Electric Corporation is a subsidiary, reappraised properties originally evaluated by an outside organization, and then those figures were spread upon the books without regard to book valuations.

The total appreciations or "write-ups" of 31 utilities which are controlled by the Pennsylvania Electric and operating chiefly in Pennsylvania amounted to $15,074,390, according to Mr. Van Zandt's testimony. He stated that the Pennsylvania Electric has been paid a total of $417,488 in accrued income taxes from subsidiaries for settlement of consolidated federal tax returns in 1927, 1928 and 1929. In explaining the Associated's practice of having each intermediate holding company collect the accrued taxes and passing it to the next higher holding company, Mr. Van Zandt said:

"It is interesting to note that the Associated Gas & Electric Company paid no income taxes to the Bureau of Internal Revenue during the years 1927, 1928 and 1929. The result of this interesting procedure was the accrual by the senior holding company of an amount of so-called income at the expense of the several operating companies, which in fact was not paid to the United States government. This procedure created a deduction from the operating companies which was presumably recouped through rates for electricity, gas or other service charges to the consuming public."

Activities of the Binghamton Light, Heat & Power Company, control of which was obtained by the Associated Gas & Electric Company through acquisition of the common stock before its merger with the New York State Electric & Gas Corporation, were also discussed at the hearings last week. The Federal Trade Commission was told by Mr. Van Zandt in addition that although the Erie Lighting Company, controlled by the Associated Gas & Electric Company through the Pennsylvania Electric Corporation, had declared dividends of $300,000 on "preference" stock in 1928 and 1929, these dividends were never paid. He testified that he was unable to find any explanation for the failure of the company to pay out these dividends to stockholders although they were credited to the accrued liabilities of the company.

Maryland Utility Sold to Consolidated G., E. L. & P.

Consolidated Gas, Electric Light & Power Company of Baltimore has purchased all property and franchise rights of the Annapolis Chesapeake Bay Power Company for $1,900,000. The sale was made at public auction and followed several preliminary offerings (ELECTRICAL WORLD, July 23, page 99).

The sale includes the property of the Bay Power Company in Anne Arundel, Prince Georges, Calvert, Montgomery and Howard counties. In addition to the sale price, the Consolidated assumes a first mortgage of $1,428,600 and other debts amounting to $80,000.

The property was sold by Albert G. Towers, receiver, and the transaction must be approved by the federal court in Baltimore and the Public Service Commission of Maryland.

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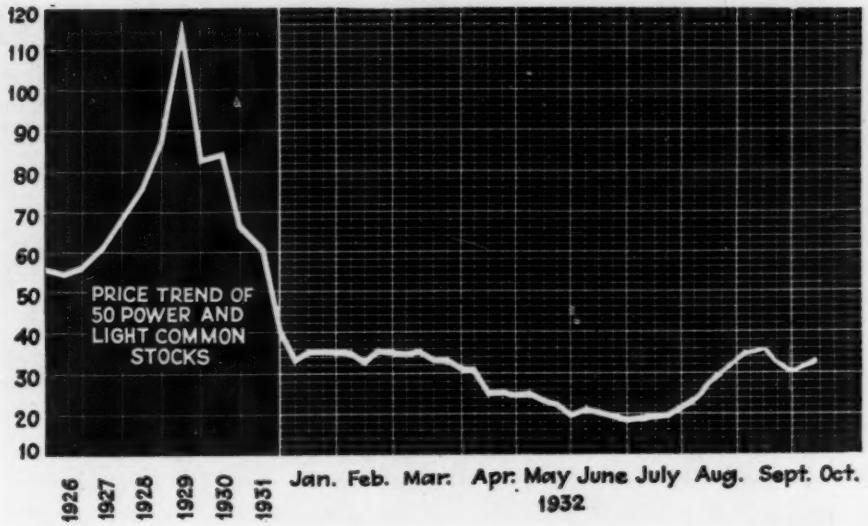
Portland Utility Inquiry Covers Security Issues

Proceeding through its third tedious week, closing September 30, the hearing in Portland, Ore., before the State Public Utility Commissioner on the affairs of the Pacific Northwest Public Service Company is still in the midst of an investigation of the facts surrounding the exchange of former Portland Electric Power Company preferred stocks for the $4 preferred issue of the Central Public Service Company, the local company's parent. C. M. Thomas, utility commissioner, on receipt of a number of individual complaints and on his own motion, ordered an investigation into the franchises, capitalization, corporate affiliations, practices, management and general dealings of Portland Traction Company, Portland General Electric Company and Pacific Northwest Public Service Company (ELECTRICAL WORLD, September 24, 1932, page 392).

Characterized by the company as a "fishing expedition" without a clearly defined case, the hearing has brought forth dozens of witnesses, including commission engineers, company employees and stockholders to tell about many phases of the company's operations.

Greatest public interest, however, centers around the investigation into the exchange of stock involving the investment by local people in some $11,500,000 of Central Public Service preferred. Toward the end of the September 30 session Commissioner Thomas gave an indication of the trend the hearing would take on its resumption, namely, an endeavor to learn if fraud and misrepresentation have entered into these stock transactions and if the use of the mails was a factor in the situation.

Utility Stocks Move Upward



Though stock prices moved within narrow limits changes were sufficient to carry the "Electrical World" index up to 32.2, as compared with 31.3 the preceding week.

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Utility Financing Lags Far Behind 1931

New financing by electric light and power companies has fallen off considerably, the total for the nine months ended September 30 amounting to but $305,303,800, as compared with $1,139,420,000 for the similar period of 1931. (These figures represent public offerings only.) Following the lull which characterized May and June there was a pick-up in July and August due largely to an increase in refunding operations, but a decline set in in September, when new issues totaled only $7,746,000, as compared with $62,427,000 in August this year and against $34,500,000 for September, 1931.

Only four companies entered the market in September and the largest loan floated amounted to only $4,000,000, as indicated by the table below.

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Flint Takes Action to Set Rates

Flint, Mich., has determined to set the gas and electric light rates for that city under Section 180 of the Flint Charter, which gives the city the right to set rates where franchises have expired. When Flint applied to the state commission in 1920 under the former charter, the application contained a clause whereby the city could abrogate the agreement on ten days' notice. City Attorney Frank G. Millard reports that the notice of ten days' waiver has been served on both the Consumers Power Company, which serves the city, and the State Public Utilities Commission.

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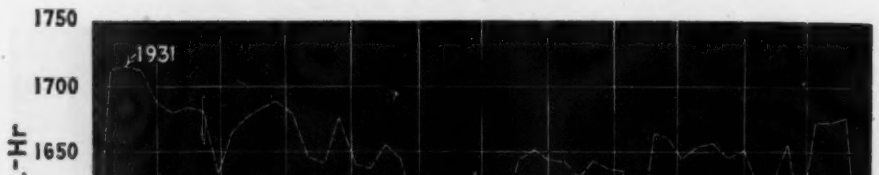
Virginia Rate Agitation

Provided that funds can be raised to defray expenses the League of Virginia Municipalities will undertake a survey to determine whether or not public utility rates in that state are too high. Contributions are being asked on a basis of $2 per 1,000 population from each member of the league.

Name of Company	Amount of Issue (Par Value)	Period (Years)	Class	Purpose	Interest Rate	Price	Per Cent Yield
Central Illinois Electric & Gas Co.	$746,000	20	First and refunding mortgage gold bonds	To retire maturing obligations and for additions	6	82	7.80
San Diego Consolidated Gas & Elec. Co.	2,000,000	28	First and refunding mortgage gold bonds, series D	To redeem notes and for other corporate purposes	5½	96	5.79
Oklahoma Gas & Electric Co.	1,000,000	18	First mortgage gold bonds	Additions and extensions	5	87	6.23
California Oregon Power Co.	4,000,000	10	Refunding mortgage gold bonds	Additions and for other corporate purposes	6½	93	7.50
Total	$7,746,000						

Again More Output



FURTHER increase in the rate of electrical energy production is revealed in the reported output of 1,499,495,000 kw.-hr. for the week ended October 1, announced by the National Electric Light Association. By itself an advance of 0.6 per cent over the preceding week would be of minor significance; considered as part of a 6 per cent rise since the week of August 13 it assumes more importance. Can it be that after three years of erratic fluctuations a healthy seasonal swing is in progress?

Although production continues less than in 1931 the gap is getting smaller. The disparity is now 8.9 per cent; for the week before it was 10.2 and for the next preceding 11.2 per cent. In the middle of July it was 13.9 per cent.

Except on the Pacific Coast production has been coming up more closely to last year's, with noteworthy gains in the Central industrial area and New England.

Weekly Output, Millions of Kw.-Hr.

Week Ended	1932	1931	1930	1929
October 1	1,499	1,646	1,711	1,819
September 24	1,491	1,660	1,714	1,778
September 17	1,476	1,663	1,722	1,792
September 10	1,444	1,582	1,727	1,806
September 3	1,465	1,636	1,630	1,675

Per Cent Change from 1931

Region	Week Ended Oct. 1	Sept. 24	Sept. 17
Atlantic Seaboard	— 4.2	— 6.9	— 7.3
New England alone	— 1.6	— 6.0	— 4.1
Central industrial	—11.1	—13.8	—15.3
Pacific Coast	— 8.6	— 8.1	— 5.6
United States	— 8.9	—10.2	—11.2

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August Revenue Down, but Output Rises

As was anticipated on the basis of reported energy output during the preceding month, August revenue of electric light and power companies was materially smaller this year than in 1931. Preliminary analysis of returns thus far received shows an average decrease of 10.1 per cent, against 8.9 per cent in July.

While this is the greatest disparity yet announced, the results are consistent with the statistics on energy production, if it is assumed that August revenue reflects the preceding month's output. It will be recalled that in July the kilowatt-hour output fell to its lowest point, compared with the year before, and that during the past two months it has been gradually regaining some of the lost ground. Whatever influence this may have had on revenue will probably appear when returns become available for September and October.

On the basis of $167,380,000 in 1931, this year's August revenue is provisionally estimated at $150,500,000, as against $152,370,000 for July.

Comparisons with energy statistics for the same month, indicative of the probable trend in revenue, are made possible by the latest monthly report of the Geological Survey. The ground covered by the latter is somewhat broader, since it includes plants other than central stations, but these constitute by far the largest portion.

Region	Per Cent Change in Energy Production from 1931 June	July	August
New England	—17	—18	—13
Middle Atlantic	— 8	—12	— 8
East North Central	—14	—19	—16
West North Central	— 3	— 8	— 6
South Atlantic	—18	—22	—16
East South Central	—22	—17	— 6
West South Central	—13	—14	— 9
Mountain	—31	—28	—22
Pacific	—11	—15	—11
United States	—13	—16	—12

The report shows that output remains smaller than in 1931, but increased 3.3 per cent in August compared with July. Total production was 6,740,000,000 kw.-hr., against 6,526,000,000 kw.-hr. in the preceding month.

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Britain Used 203 Kw.-Hr. per Capita for 1930-31

The British Electricity Commission has just issued the annual engineering and financial return relating to electricity supply in the United Kingdom for 1930-31.

It deals with 666 separate authorized undertakers, having 483 generating stations, of which 252 are owned by public authorities and 231 by companies. The kilowatt-hours sold to consumers amounted to more than 9,073,000,000, showing an increase of 408,000,000 over 1929-30. On the basis of an estimated population of 44,700,000 the sales in 1930-31 represented an average consumption of 203 kw.-hr. per capita.

This figure does not constitute an absolute measure of the total consumption of electricity, as some stations which generate large supplies for traction, colliery and other industrial purposes are not included. The number of consumers at the end of 1930-31 was 4,014,895, an increase of upward of 543,000, or more than 15 per cent, on the figures for the previous year.

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Tax on Wires and Poles Proposed in Illinois

If a bill (H. 36), introduced at a special session of the Illinois Legislature, is passed, an annual license fee upon the poles of any electrical transmission system on public highways will be collected. The amount of the proposed fee would be based upon the voltage carried over the poles, the number of conductors used and the number of pairs of wires carried in aerial or underground cables.

The fee would be payable to the county within which the poles are located and the proceeds would be used only for the relief and support of poor and indigent persons in such county.

Municipally owned electrical transmission systems would be exempted from the provisions of the act so far as such systems are located wholly within the corporate limits.

Another bill (H. 38) proposes a tax of 3 per cent upon the gross earnings of the intrastate business of public utilities during the period from October 1, 1932, to July 1, 1933. The proceeds would be paid into the emergency relief fund of the state treasury.

4,000,000 Lb. of Copper Bought by Westinghouse

Orders for 4,000,000 lb. of copper, an amount said to be far in excess of current business demands, have been placed by the Westinghouse Electric & Manufacturing Company, according to an announcement by President F. A. Merrick.

"The world isn't finished," states Mr. Merrick, "and as electricity plays such a large part in our lives today, we are hopeful that even these large reserves of copper will shortly need replenishment. We foresee other opportunities for the purchase of materials and supplies which we hope to take advantage of at the present favorable price levels."

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Atlanta Considers Plant to Be Built with R.F.C. Funds

Based upon the assumption that the Reconstruction Finance Corporation will consent to advance the money, a comprehensive water supply, sewer and municipal power plant scheme has been proposed for Atlanta, Ga.

A 130-ft. dam across the Chattahoochee River, near Dunwoody, Ga., could impound a lake extending almost to Gainesville with a surface area of 20,000 acres and a shore line of nearly 500 miles. A potential 18,000 hp. hydroelectric energy is anticipated. Of this 4,000 hp. would be utilized to pump water and supply municipal services, leaving 14,000 hp. for sale to consumers.

The plan calls for the creation of a corporation to operate the water and power system, which would receive from the city a lease on the property involved for the payment of $6,000,000, while the city would agree to pay the corporation the $750,000 now annually spent for the pumping and distribution of water and the power used.

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G. E. Relief Plan Continues

By vote of the employees' representatives of the Schenectady works of the General Electric Company the 2 per cent deduction from wages in behalf of unemployment emergency relief will continue through the coming winter. This action was decided upon as the previous period for which the 2 per cent deduction instead of 1 per cent had been agreed upon expired. The company will, as before, contribute dollar for dollar with the employees.

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Federal Insulation Specifications

Revision of the federal specifications for insulation, wire, cable and rubber for general purposes is proposed to supersede those made effective in December, 1928. The specifications are being circulated among representative manufacturers for comment and criticism by J. Lyman Briggs, acting chairman of the Federal Specifications Board.

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New York Metal Prices

	Sept. 27, 1932 Cents per Pound	Oct. 4, 1932 Cents per Pound
Copper, electrolytic	6.25	6.25
Lead, Am. S. & R. price	3.15	3.25
Antimony	5.625	5.625
Nickel ingot	35.00	35.00
Zinc, spot	3.60	3.45
Tin, Straits	24.70	24.25
Aluminum, 99 per cent	23.30	23.30

Major New Construction This Week

ELECTRICALLY operated pumping machinery, heavy-duty motors and controls, transformers and accessories, regulators, etc., will be installed in new additions at Torrance, Calif., oil refining plant of General Petroleum Corporation, Los Angeles, Calif. A $1,000,000 project.

Electric-operated washing machines, pasteurizers, churns and other dairy machinery, motors and controls, regulators, conveyors and auxiliary electrical equipment will be installed in new addition to Willow Brook Dairy, Mount Vernon, N. Y. Estimated cost over $350,000.

Machine drives, motors and controls, regulators, elevators, industrial lighting equipment, etc., will be required for new multi-story yeast plant at Oakland, Calif., by Standard Brands of California, Inc., San Francisco. Estimated cost $750,000.

Electric pumping machinery, transformers and accessories, controls etc., will be installed in new 10,000,000-gal. pumping plant of Washington Suburban Sanitary Commission, Washington, D. C., at Burnt Mills. Cost $270,000.

Machine drives, heavy-duty motors and controls, regulators, transformers and accessories, etc., will be required for new machinery repair shops and caricing plant at Colton, Calif., of Pacific Fruit Express Company, San Francisco, Calif. Cost over $85,000.

Until October 11 General Purchasing Officer, Panama Canal, Washington, D. C., asks bids for 360,000-ft. solid copper wire, 10,000 ft. switchboard wire, 30,000 ft. weatherproof wire, 100,000 ft. rigid steel conduit, six transformers, 750 toggle switches, fuses, insulators and other electrical supplies (Schedule 2795).

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Exports of Electrical Equipment (Preliminary)

Article	July 1931	July 1932
Generators:		
Direct current	17,491	2,802
Alternating current	37,973	8,544
Steam turbine - generator sets	63,610	2,357
Accessories and parts	35,066	22,429
Arc-welding sets	33,466	13,129
Self-contained lighting outfits	46,780	31,613
Batteries:	441,099	283,516
Transforming or Converting Apparatus:		
Power transformers over 500 kva.	2,859	.....
Distribution transformers 500 kva. and less	17,713	33,842
Instrument transformers	3,934	26,965
Other transformers	26,739	16,575
Complete battery charges and non-rotating	3,116	1,481
Double current and motor-generators, dynamotors, synchronous and other converters	123,483	35,493
Transmission and Distribution:		
Switchboards, circuit breakers over 10 amp. and fuses	155,400	92,502
Watt - hour and other measuring meters	37,058	25,274
Indicating and recording instruments	58,421	45,791
Other electrical testing apparatus	47,811	28,329
Lightning arresters, choke coils, reactors and parts	65,815	33,331
Motors, Starters, etc.:		
Fractional-horsepower motors	159,909	40,749
Stationary motors	155,078	42,173
Railway motors	49,042	.....
Electric locomotives	43,470	9,829
Electric motor trucks	24,573	2,395
Starting and controlling equipment	119,741	47,551
Portable electric tools	70,193	28,134
Accessories and parts	139,233	51,261
Electric Refrigerators:		
Household	537,703	202,067
Commercial up to 1 ton	157,793	72,139
Parts	266,730	107,215
Electric Appliances:		
Flashlight cases	42,612	23,079
Electric fans	33,213	10,962
Electromechanical health exercisers	2,564	343
Electric incandescent bulbs	85,064	38,403
Searchlights and floodlights	10,737	5,912
Electric household washing machines	69,303	26,120
Electric domestic vacuum cleaners	120,503	28,381
Other domestic motor driven devices except tools	35,158	13,039
Electric flatirons	11,702	3,610
Electric cooking ranges	29,412	10,536
Other domestic heating and cooking devices	37,810	20,612
Industrial electric furnaces, ovens and other heating devices	266,321	17,604
Therapeutic and X-ray Apparatus	103,782	39,781
Signal and Communication Devices:		
Radio apparatus	1,606,872	964,222
Telegraph apparatus	77,658	21,149
Telephone apparatus	120,268	72,601
Bells, buzzers, annunciators and alarms	20,338	7,680
Other Electric Apparatus:		
Starting, lighting and ignition equipment	81,798	53,980
Insulating material	40,114	23,148
Miscellaneous wiring supplies	813,196	408,307
Electric porcelain	106,407	25,346
Carbons and Electrodes:		
Electrodes for electric furnaces	107,034	62,247
Other carbon products	37,698	.....
Carbon brushes and stock	.....	9,608
Other carbon products	.....	29,091
Insulated iron or steel wire and cable	10,170	1,537
Copper, bare wire	38,625	10,952
Insulated copper wire and cable:		
Rubber-covered wire	44,349	40,086
Weatherproof wire	13,970	18,102
Telephone cable	7,479	1,155
Other insulated copper wire	124,402	41,695
Nickel-chrome electric resistance wire	32,390	28,815
Electric clocks	.....	5,342
Totals	$7,072,254	$3,371,262

N.E.M.A. Elects Officers

Officers for 1932-1933 elected last week at the annual meeting of the National Electrical Manufacturers' Association were: President, J. S. Tritle, Westinghouse Electric & Manufacturing Company; vice-presidents, Otto H. Falk, Allis-Chalmers Manufacturing Company; D. R. Bullen, General Electric Company; W. E. Sprackling, Anaconda Wire & Cable Company; S. L. Nicholson, Westinghouse Electric & Manufacturing Company, and F. R. Fishback, Electric Controller & Manufacturing Company; treasurer, R. H. Goodwillie, Otis Elevator Company.

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Beauharnois in Operation

On October 1 the 500,000-hp. hydroelectric development of the Beauharnois Light, Heat & Power Company on the St. Lawrence River, near Montreal, began commercial operation.

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Ohio Mayor Vetoes Rate Ordinances

Mayor W. A. Lynn of Warren, Ohio, recently vetoed five electric light rate and franchise ordinances passed by the City Council, declaring the rates too high and that the franchise to the Ohio Public Service Company should be for ten years instead of twenty.

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California Edison Loans Reduced

The Southern California Edison Company, Ltd., reports that in the first half of this year it had paid all its $7,500,000 bank loans outstanding at the end of 1931. Cash items declined only $673,673, or 19 per cent, in the half-year to $2,888,845.

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Los Angeles Plant May Be Built

Denial of the petition of the Southern California Edison Company, Ltd., and others (ELECTRICAL WORLD, August 27, page 258) to restrain the Los Angeles Water and Power Bureau from proceeding with the construction of its proposed $7,000,000 steam plant at Seal Beach, on the grounds that such an expenditure would constitute an illegal use of city funds, has been made by Superior Judge Hahn in Los Angeles.

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Youngstown Rejects New Rate

Youngstown (Ohio) City Council has rejected the Ohio Edison Company's proposal of a flat rate of 5.5 cents per kilowatt-hour for electricity and authorized its utilities committee to continue negotiations for a rate lower than the existing 5.7-cent charge. Ohio Edison offered an optional rate, benefiting large customers, to take effect when business improves, provided the Council would accept the 5.5-cent rate, which would benefit small consumers slightly.

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WASHINGTON MEMORIAL HIGHWAY LIGHTING

Such natural-cedar lighting standards as these line the new Washington Memorial Highway between the Lincoln Memorial in Washington, D. C., and Mount Vernon. All wiring is in underground armored cable. Lead-covered cable spliced to the main at the manhole is brought up through a 10-ft section of conduit and cleated to the standard from there on.

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$34,000,000 Santee River Project

Amendment of the license of the Columbia Railway & Navigation Company to permit the construction of a $34,000,000 power plant on the Santee and Cooper Rivers in South Carolina has been sought from the Federal Power Commission. The development originally planned called for an expenditure of $20,000,000. Protests were made at a recent hearing in which it was charged that there is no demand for the additional power contemplated and that a large area of land would be injured by the diversion of the water. Request was made by protestants that the original license be revoked because of the failure of the company to carry out the construction program.

Madison, S. D., to Get R.F.C. Aid

The Reconstruction Finance Corporation announces that aid will be given Madison, S. D., toward the financing of an addition to the municipal electric light and power plant. The corporation will purchase $105,800 of the revenue bonds of Madison at an interest rate of 5½ per cent. This is viewed by the federal board as a so-called self-liquidating loan and is the first of a number of comparatively small similar projects which the R.F.C. announces its intention of aiding.

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I. E. S. Elects New Officers

At its recent convention in Swampscott, Mass., the Illuminating Engineering Society elected the following officers: J. W. Barker, president; E. H. Hobbie, treasurer; D. W. Atwater, general secretary; Julius Daniels and W. F. Little, junior past-presidents, and J. L. Stair and A. L. Powell, vice-presidents.

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Scottsbluff Rejects Municipal Plant

In a spirited election voters of Scottsbluff, Neb., defeated a measure involving municipal ownership of the local light and power plant. Success of the proposal would have meant condemnation of the Western Public Service Company's new four-story office building, generating plant, distribution system, ice plant, steam-heating system and transmission lines serving adjacent territory, and acquisition of these properties by the municipality at an undetermined price. This appears to settle the municipal plant question for some time. (ELECTRICAL WORLD, August 13, 1932, page 195.)

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Abitibi Power in Bankruptcy

On the application of the Canada Packers Company of Toronto, the Abitibi Power & Paper Company, Ltd., has been declared bankrupt by Justice Sedgewick. At the request of the petitioners and other trade creditors, F. C. Clarkson was appointed liquidator. Action was begun by the Montreal Trust Company against the Abitibi company for the administration and execution by the court of the mortgage trusts made June 1, 1928. On September 10 Justice Riddell made the order appointing G. T. Clarkson receiver and manager on behalf of the Montreal Trust Company, the trustee and the bondholders (ELECTRICAL WORLD, September 17, page 360). Mr. Clarkson is reported as stating that the operation of the company would proceed along the same lines as originally laid out after he became receiver and manager.

Probable Electrical Code Changes in 1933 Reviewed by N.F.P.A. Chairman

DISCLAIMING any power to influence committee recommendations or the action to be taken upon them, but nevertheless conceding that "the job of chairman of the electrical committee does permit me to know about many proposals which are having study" and will be "so handled as to make the next or 1933 code different from the present text," A. R. Small, vice-president Underwriters' Laboratories, Inc., and chairman of the electrical committee of the National Fire Protection Association, discussed the code at the annual meeting of the southern section, International Association of Electrical Inspectors, this week. Mr. Small said:

"The representation in the electrical committee will be about as previously, both as to personnel and as to organizations for which they speak. My records do not indicate a likelihood of any important changes in Articles 1, definitions; 2, general, or, 3, outside supply lines. As to Article 4, services and service equipment, there may be some lifting of present limitations on the use of a non-insulated grounded neutral service conductor and as to conditions where branch circuit control only at the service equipment is permitted.

"Article 3, wiring methods, has been the subject of a number of major reconstruction operations in the past ten years. Structurally, this rebuilding seems to have satisfied present-day requirements. There are various minor items to be considered. Among these is the new Section 516, covering so-called non-metallic surface extensions. The article committee must take account of the fact that extensions to existing branch circuits, if recognized in principle, need not be non-metallic and more generally it must find that too much detail in a code rule is liable to hamper the rational development of a new art.

"The scope of Article 6, conductors, is very considerably extended by including therein Section 613, demand calculations for feeder sizes. This section was originally developed to avoid using extremely heavy copper in risers and feeders such as are found in tall buildings. It is likely that paragraph 18, covering demand for range and large appliance loads, will be studied. The Article 6 committee is properly concerned with the responsibility of so classifying cords for their promoted and proper uses that personal injury and fire hazards are multiplied in a ratio at least no greater than the increase in appliance use.

"Article 7 committee's chief concern at present is the proposal to require flame-proof coverings on groups of conductors confined in gutter spaces and similarly.

"The automatic protection of circuits and appliances against overload is necessarily a hardy perennial problem. At present the Article 8 committee is studying Section 808 to clarify certain inconsistencies which field trial has exposed in protecting groups of small motors with a single motor-feeder overcurrent device. The starting current conditions when the largest motor on a feeder exceeds 40 per cent of the total motor load are not always as assumed in 808-a.

"The combined question of when, what and how to ground is another hardy perennial in the crop of code problems. The committee on Article 9, grounding, is struggling valorously with this very difficult job. A new question is the interconnection of primary lightning arrester grounds and the secondary ground at the pole or service.

"In Article 10, covering rotating machinery, the present-day interest seems to be with motor-circuit disconnects, what are they and their relation to the controller and what is a controller if the motor is of the across-the-line-start type.

"It now appears likely that very few changes will be proposed throughout Articles 11 to 19, inclusive, except as modifications in Article 16 become in order as action is taken in other articles. Similarly, the probable changes in Articles 31 to 35, inclusive, will be few and of minor import, although certain details are having consideration in each case.

"The committee on Article 37, radio, has promised a comprehensive revision for the coming code. In particular it is expected that central radio reception matters will have special attention.

"The continued development of inert gas tube design and application will very likely call for changes in Article 38. Possibly the new text will answer for me one question that is troublesome. The question is: When is an interior portable lighting fixture an electric sign? At present the answer seems to be, When gas-tube lamps are used."

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Lighting Codes Backed by Labor Department

Lighting codes, says a recent announcement of the Department of Labor, represent the most effective action that the states have taken in the matter of industrial lighting, but they are being observed in only thirteen states. An analysis of the lighting requirements of the states shows in nineteen no general law nor other requirement for lighting in manufacturing or mercantile establishments.

In addition to the states with lighting codes eight states and the District of Columbia have some general requirement for lighting in all parts of manufacturing and mercantile establishments, while the remaining ten states have lighting requirements only for certain limited places.

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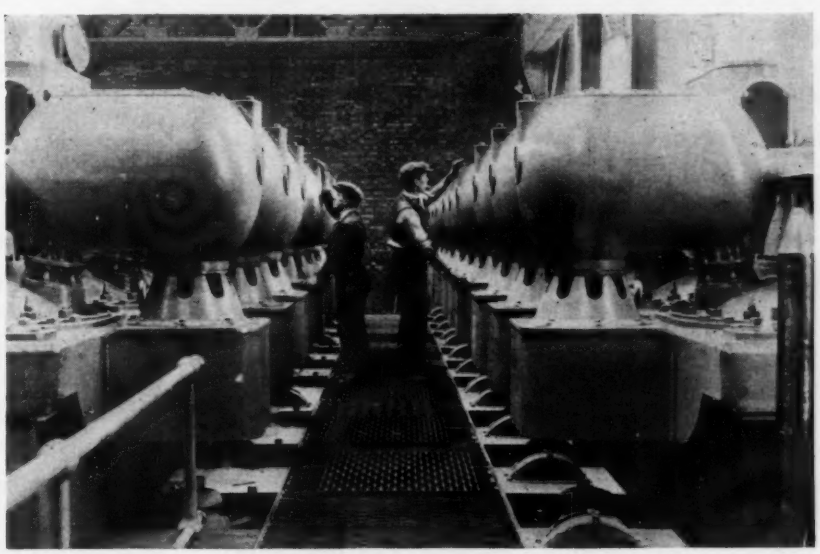
METAL-CLAD SWITCHGEAR AT BATTERSEA



England's newest and largest power station, now nearing completion, has metal-clad equipment for main switching services. As shown here, apparatus is installed indoors rather than outside, as has been done with some large installations in this country.

EDITORIALS

L.W.W.MORROW
Editor

Utilities should take lead in rehabilitation plan

MANIFESTLY we have recovered from last spring's feverish panic, but by no means have we recovered from the malignant slump. Governmental emergency measures beat the panic, but in the long pull out of the depression convalescent business must help itself. Nourishment rests primarily in exerting the will to buy and to spend, with self-interest uppermost and patriotism following close in the wake. The will to spend depends on having the wherewithal or the means of getting it easily. Both situations exist. Some industrial firms have surplus cash or funds that have reacquired liquidity; others know banks now have excess idle funds which will flow where the lure is great enough and safe enough.

For these industries will the Robertson Committee on Industrial Rehabilitation perform a function directly contributory to acceleration of business. Further than that, it is directed toward the so-called capital goods industries which are at the lowest ebb and can therefore render the quickest aid in reducing unemployment and increasing consumptive power. Its objective is to modernize a sizable part of the 55 per cent of obsolete equipment in the industrial plants of the country. Ingenuity and invention in the last three years have accentuated the inadequacy of much of the existing equipment to meet the low price and moderate volume conditions that will prevail for the period ahead. Industry is going to be induced to see its economic salvation in spending for plant facilities that will produce more economically without displacing more labor but, on the contrary, putting others to work in the tributary machinery and raw materials industries. The banks are going to be active participants.

The electrical industry can participate wholeheartedly in this program and gain thereby by being on the giving and receiving sides at the same time. Utilities especially can share and even lead in the local committees that are being formed to provide specific data proving economic value of rehabilitation *now*. They can do it with assurance that it is a most timely and strategic move toward getting the wheels going. Maybe our economic system is just a dizzy American merry-go-round, but it is all we have and we may as well make it spin usefully until we devise an improvement.

Regulation in the marketplace

AS POINTED out recently by Governor Trumbull the electrical industry faces more and more regulation in the marketplace. Local ordinances are being used very frequently to prescribe both electrical installations and conditions pertaining to appliance sales. This type of regulatory legislation improperly conceived and enacted becomes a menace. There should be no special interest served and the regulation should be in the public interest. It should be uniform, it should permit market expansion and it should permit the admission of new and better materials and appliances into the marketplace.

It is the part of wisdom for all branches of the electrical industry to observe and guide this regulatory movement so that it is not placed on the defensive or in a position of antagonism to regulatory suggestions developed by other agencies. A start in this direction has been made by the manufacturers, as outlined in this issue, but it is necessary and urgent that other branches of the industry be brought to the council table so that industry agreement is had and a method is established to bring the industry policies to bear properly and effectively. The regulatory movement is here and it may seriously affect the ability of the electrical industry to expand its business and service unless steps are taken to make regulation fair and in the public interest.

Practice new selling now

THE electrical industry is vitally interested in promoting the national program of modernization and rehabilitation. It is a business opportunity in a dead period, but beyond this, it will serve to educate the electrical industry so that it will sell better and more intelligently in the coming years.

Modernization and rehabilitation are based upon the customer's economic needs. It is premised upon economic purchases and not high-pressure salesmanship. This means that an electrical industry salesman must sell something other than motors, control, generators and other apparatus. He must sell upon the basis of meeting the economic need of the customer, and this requires him to have a very intimate knowledge of each customer's business. He must know the customer's process or manufacture from raw material to ultimate product. He must know the best practices and best equipment to use in each business. Moreover, he must know costs and returns and accounting practice. To sell under this program, in other words, the salesman must know what is modern and prove that the use of the modern pays.

This is a difficult sales specification, but it is becoming more and more apparent that the industry that first changes its sales program to conform to these specifications will be the leader in the marketplace when business recovers. Thus, even if the electrical industry sells no modernization or rehabilitation at this time it will pay to try to do so, and we venture to assert that it will also do some business.

Stress brings co-operation

BUSINESS leaders of the electrical industry have come to realize that internal industry disputes should not be permitted to jeopardize the endeavor of the industry to maintain and even advance its position in the consumer market. As pointed out by F. A. Merrick in this issue, the time has come for the electrical industry to co-operate in building business instead of fighting to secure a selfish position for its industry branch. It is time to call an internal disarmament conference and to organize to meet the competition of other industries.

Disputes about wiring, about appliance quality, about standardization procedure, about merchandising practices, about the code and about regulatory ordinances merely dissipate the strength of the industry in the marketplace. Never has there been a more opportune time for leaders of the several branches of the industry to get together, hear the individual arguments and points of view with open minds and then agree upon procedures and practices. In the final analysis each branch can prosper only as the electrical market is sold, and this market can be sold only by co-operation and hard work by all branches. Now is the time to give current disputes between branches and current handicaps to selling serious attention. Now is the time to put selfish interest aside and unite upon a program that promotes the welfare of the entire industry.

Public and private expression of opinion by leaders of each branch of the industry clearly show that this is the program that should be followed. Conferences of industry group leaders on all current problems are promised in the near future. These will bring clarification, co-operation and plans for industry progress as a certain result. This time of stress will be turned into a time of opportunity for the entire industry and the key to success is an open, frank and honest discussion about the conference table. The energy and ability heretofore devoted to internal squabbles will be turned outward to the marketplace. Who can doubt the results?

Co-operation in the Markets

By F. A. MERRICK*
President Westinghouse Electric & Manufacturing Company

Joint efforts should be made to soive industry problems.
Co-operation on wiring, financing, regulation advocated.

IN THE past the electrical industry has grown at a rate much in advance of average growth of the country, but now the percentage of increase each year will be more nearly in step with general business. This means that the industry must not pass over as unimportant any co-operative effort which will foster growth of either new installations and uses or the revamping of older installations to bring them up to date. Each of us has been so busy of late in the study of his own immediate problems that perhaps some of us have not given sufficient time to the study of the broad general problems upon which depend the development and future growth of our industry. It seems to me that N.E.M.A. should take steps to study these problems and co-operate with other branches in our industry in developing sound policies for future constructive development.

In the past and at present there have been and are misunderstandings of the aims, objects and policies of the different branches of our industry. It must be evident to any thinking man that if the electrical industry is to attain its full measure of progress these misunderstandings must be removed. Certainly without their removal there can be little hope of successful united solution of the problems which confront us.

The problems which need study are many and varied, and I can call attention to only a few of them. Proper wiring is an essential element in the development of the uses of electrical energy, both for new installations and for the rehabilitation of old ones. Many changes have taken place since the first houses were wired and improvements in wiring methods and materials have advanced rapidly. Still further developments will take place in improving wiring systems, particularly to meet the reconstruction problems. Adequacy of wiring is now being much talked of because it has been found that modern devices and equipment cannot be utilized to the fullest extent on account of inadequate wiring in the older types of installation. Much can be done to improve existing business conditions if proper policies are outlined for the rehabilitation of older installations.

In the doing of this it may be necessary to go beyond the methods which have been employed in the past and give due weight to proposals which may make for progress in their specific fields. In the economic condition which confronts us economic factors will determine what must be employed if the industry is to retain its fair fraction of the consumer's dollar.

All of this will have to be made understandable for all branches of the industry. It is a question of educating the wiring contractor so that he may become a real factor in selling to prospective customers the advantages of remodeling. New and less expensive systems may well serve as leaders to obtain eventually more permanent construction. Therefore, I feel that all disputes in reference to various types of wiring which are safe from a fire and casualty hazard should be dispensed with, as each type of wiring has its proper place in the development of the electrical industry.

Another problem is that of increasing the use of minor appliances for the home. Extensive campaigns have been carried on for the promotion of the major devices, but there is a vast field for the development of the electrical industry in the minor appliances, and co-operative plans should be worked out with the manufacturer, utility and contractor looking to the increase of this market. As a matter of fact, the trend has been the reverse and there has been a very definite decrease in the sales of products of this nature for some time past.

Within recent years the electrical industry as a whole has been confronted with regulatory legislation of one form or another and advocacy of such legislation seems to be growing. There are ordinances in regard to inspectors and local regulations, the licensing of contractors and the so-called sales ordinances. We can readily realize that unless there is some uniformity in these regulatory measures there will be confusion and increased cost in the development of the electrical industry without advantage to the ultimate consumer or to the public.

Regulatory ordinances

N.E.M.A. has for a long time endeavored to bring about one basic uniformity in the ordinances, namely, that feature establishing the National Electrical Code as *prima facie* evidence of approved, safe and acceptable installation. It has not promoted any other form of ordinances, but has, wherever possible and acceptable, assisted with its influence to the end that these ordinances were of such character that no interference would be had with the free distribution and use of safe electrical products.

Another matter requiring consideration on the part of manufacturers, along with the utilities and contractors, is the question of financing. The American public has been educated to the deferred-payment system, and whether or not he proposes to employ it in the particular instance, the salesman is handicapped if he cannot offer it.

In recent months the question of cost of this financing has been brought to the forefront by a committee of the National Electric Light Association, which has asked for the co-operation of N.E.M.A. in the study of this problem. I believe that all manufacturers affected should

**Abstract of address presented before the National Electrical Manufacturers' Association, Rye., N. Y., September 27, 1932.*

give it careful consideration and that N.E.M.A. should co-operate with the other branches of the industry in making a careful study with a view to developing constructive policies on this question. The obvious method of handling these matters would be through the organized financing corporations, but it is believed that these corporations need to study carefully the conditions peculiar to all phases of the electrical industry prior to making a decision as to the methods which they should employ. Their thinking in the past has been geared to the financing of individual amounts greatly in excess of those usual in the distribution of electrical material, and this is a vital factor in the problem.

The time is ripe for the membership of N.E.M.A. and the board of governors that they promptly take steps to arrange for joint conferences with the other branches of the industry with a view to solving these problems. It would be well to consider at the same time and through the same avenues the problem of research and promotion, jointly initiated, maintained and financed by the manufacturers and the other branches of the industry which are affected.

The phases of the electrical industry that require quickening are those having to do with promotion of sales of current and of apparatus and supplies for its utilization. These considerations are emphasized as being particularly timely because I am convinced that we have seen the worst of the business depression and that in the coming period of business increase the opportunity will be present for profit to all, but only if all branches of the industry are working together harmoniously for an increasing use of electrical energy.

The aims of N.E.M.A. and of the industry as a whole can be realized only by such close acquaintance and broad-minded frank and fair discussion among the members and member units as will prevent any misunderstandings either of objectives or of methods.

The same principles which have guided the conduct of internal proceedings of N.E.M.A. for the good of all manufacturers should be capable of demonstration and application for a satisfactory working with the other industry groups. These subjects call for and warrant the active interest of the executive heads of all member companies.

Sixteenth Century Palace Abandons Charcoal and Candles

La Fortaleza, the Governor's Palace at San Juan, Puerto Rico, erection of which started about 1529, has just recently abandoned charcoal and candles for electricity, according to D. O. Bergey, power sales engineer Porto Rico Railway, Light & Power Company.

In the sixteenth century the residents of La Fortaleza lacked many of the conveniences which Gov. James R. Beverley and his household now enjoy. Then clothes were washed in a neighboring stream and the irons were heated on charcoal pots. The water supply for the household was hauled by a yoke of oxen from a nearby stream because a running hot and cold water system had not then been conceived. Imagine how difficult it must have been to care for perishable foods in the tropics prior to the advent of the electric refrigerator. In those days all cooking was done on large charcoal stoves; one of which is still retained in La Fortaleza for display.

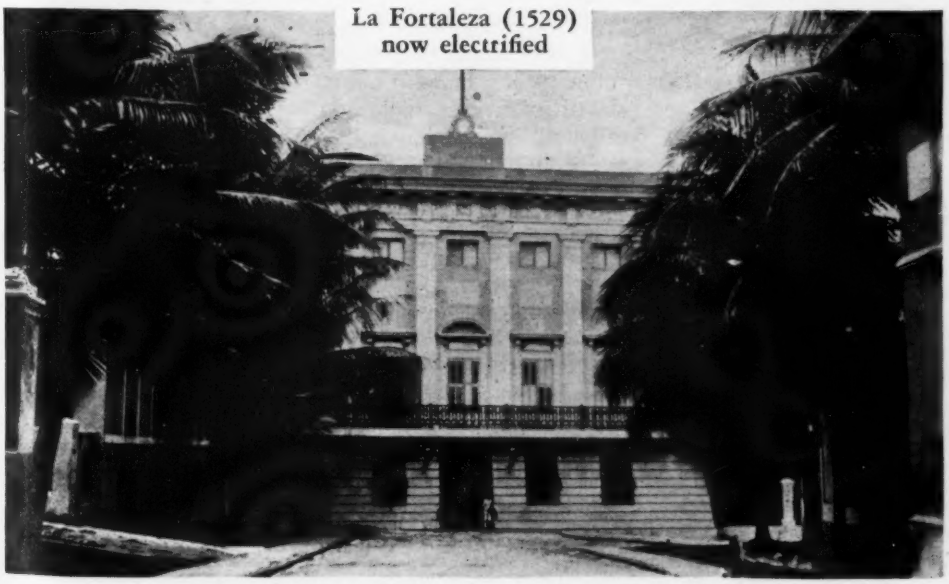
In the early days a number of beautiful chandeliers were brought from Europe and installed in the reception rooms of La Fortaleza. The specifications for the modern lighting system required, in addition to adequate lighting, the adaptation of these rare chandeliers to electricity. Today the electric lamps in these chandeliers produce an illumination many times greater than was possible with their predecessor—the candle.

The laundry, which is in constant operation, except Sundays and holidays, is equipped with a 10-gal. automatic water heater, supplying a washing machine. Seven six-pound electric irons are used to iron all the laundry, including the white linen suits so popular in the tropics. Because the water pressure on the upper floors of La Fortaleza has been inadequate in the past, an automatic electric booster pump has been installed.

In the kitchen food is prepared for the large official dinners given by Governor Beverley, a heavy-duty hotel type range having been installed to provide ample service and oven capacity for the largest dinners. A 17-cu.ft. electric refrigerator enables the housekeeper to purchase more economically and protect the health of the Governor's household and guests. Hot water for the kitchen and numerous bathrooms is provided by a 100-gal. electric water heater.

Power is supplied by the Porto Rico Railway, Light & Power Company.

La Fortaleza is the oldest building in the new world which has been completely electrified, according to our informant, Mr. Bergey. For interesting historical background, beauty of architecture and fidelity of type this structure is one of the most interesting under the Stars and Stripes, he declares.



La Fortaleza (1529) now electrified

Industrial Diesel Plants— When Are They Justified?

By H. C. THUERK*

The Utility Management Corporation, New York City

Mr. Thuerk's penetrating analysis of the fundamental economic questions which must be solved in successfully meeting Diesel engine competition will encourage power sales engineers to renewed efforts in many industrial areas.

While the prices of many materials and securities have changed since the author presented his paper at the recent Bretton Woods convention of the N.E.L.A. the methods of procedure outlined are fundamentally useful.

The importance of using the customer's equipment purchase policy as a major factor in ascertaining correct fixed charges is emphasized by Mr. Thuerk as a key approach to difficult competitive situations.

TO PROVIDE at least a small differential between selling and cost price manufacturers are keenly interested today in reducing overhead and direct production expenses. Executives are studying cost reduction in all its phases. If we are to sell power to new customers and additional power to present customers we must in most cases (except where improved quality of product justifies higher costs) sell it on the basis of superior economy. The competition of the Diesel engine, based as it is on striking claims of savings through its use, must be met by thorough analysis of the customer's over-all power costs, which includes the frank determination of all running and overhead expenses and a close examination of labor requirements, accurate estimates of power consumption and definite understanding of the equipment purchase policies of the customer. Unless equipment will pay for itself in from three to five years many industrial concerns will not make the investment required to utilize it, and this aspect of the power supply problem deserves the closest attention from power sales departments.

**From a paper before the New England Division, N.E.L.A.*

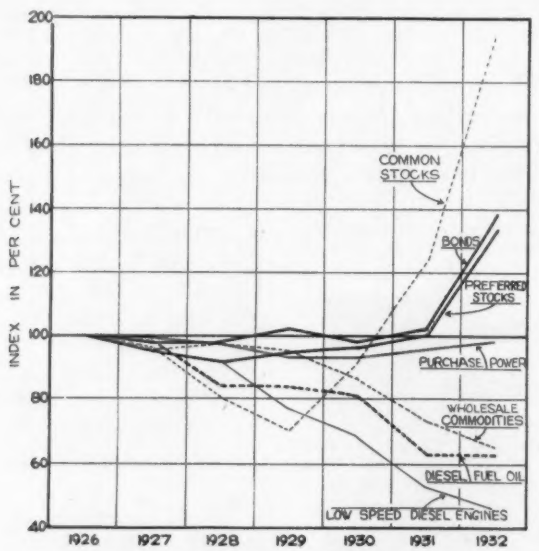


Fig. 1—Trends in commodity prices and high-grade security yields

The Alexander Hamilton Institute gives the following relations between stock and bond yields:

Average Yield	1926	May, 1932	Increase
	Percentages		
Preferred stocks	5.78	7.75	34
High grade bonds	4.60	6.42	39
Common stocks	4.94	9.57	94

This shows that high grade bonds had a lower yield than preferred stocks in the spring of 1932, but the rate of increase in the yield was greater for the bonds than the actual yields. The chart shows the increase in the yields rather than the actual yields.

Low volume means higher unit costs

At a time when the average level of wholesale commodity prices has fallen so much (Fig. 1) it is difficult for the average executive to understand why the average unit cost of electric power has not followed the same general trend. Wholesale commodity prices in 1931 were 27 per cent less and in April, 1932, 34.5 per cent less than they were in 1926. In contrast to this, the average cost per kilowatt-hour for wholesale light and power in 1931 had decreased but 2.7 per cent since 1926. He is not justified in taking this position, for if he were producing power with his own generating plant and considered total costs, including overhead and fixed charges, he would learn that when production decreases the total cost per kilowatt-hour increases materially.

Why does the industrial executive fail to make this complete analysis? Payments for the interest and amortization of the capital invested in a generating plant are not direct enough to appear real costs to him. Interest and dividends paid cover the capital invested in the entire undertaking and not just the power plant. Again, amortization of the equipment is taken care of usually by additions to the general depreciation reserve account for the entire property. Taxes and insurance for the plant are ordinarily paid for in a similar manner on the entire physical structure.

Each month the executive probably has brought to his attention only the items making up plant production expense. Against these he has to approve a monthly bill

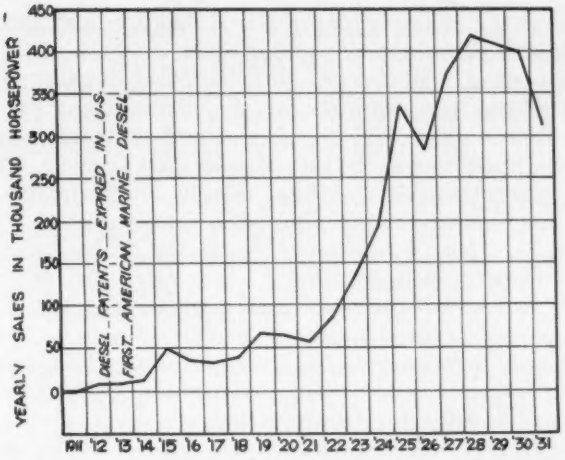


Fig. 2—Growth of Diesel engine sales in America

for purchased power, which includes not only operating costs but equivalent fixed charges. This bill looks large compared with the monthly operating expense of an isolated plant.

In 1931 Diesel sales in the United States totaled 303,000 hp., while in the first five months of 1932 the total was slightly less than 100,000 hp. (see Fig. 2). The impetus for this development has come from marine, locomotive and airplane use. The decline in the market for marine engines and the absence of a wide market for the others has intensified the sales efforts of the Diesel manufacturer in the stationary field.

Since 1917 Diesel engine weight and volume per horsepower have been reduced materially; speeds have been increased; the engine has been simplified and some progress has been made in reducing maintenance costs. The light-weight, high-speed engine is now being sold for general industrial applications. Its life is not yet known, but will undoubtedly be less than that of the heavy-duty engines for corresponding service. The prices of both light-weight and heavy-duty engines have been materially reduced in recent years.

These developments in Diesel design have resulted in a material lowering in total first cost plant. The widespread adoption of solid injection of fuel oil has resulted in an improved fuel efficiency. Fuel oil prices in New York have been reduced to 63 per cent of the 1926 basis.

"Pay-out-of-savings" plan has weak spots

Diesel engines have been quite generally sold on the so-called "pay-out-of-savings" plan. Lately Diesel manufacturers have been willing to apply this method of selling to almost any type of load. One of the large commercial financing companies estimates that approximately 55 per cent of the engines are now financed on the installment plan.

Most of the proposals made to industrial power customers are based on this "pay-out-of-savings" plan. In extreme cases no down payment is required, the total cost to be paid monthly on the basis of the difference between the operating expenses of the oil engine plant and purchased energy costs. In determining the monthly payments the operating costs of the plant are ordinarily charged with the actual cost of all fuel and lubricating oil used, actual maintenance and supplies and operating labor. In most cases the contract with the purchaser specifies that the operating labor will not exceed a certain definite figure per year. In many instances, maintenance is guaranteed by the manufacturer and in certain cases has been as low as $1 per year per horsepower. This figure is guaranteed for the period of the contract, which often runs for periods of six years or longer. In a few cases taxes and insurance are included in the operating cost.

In most of these agreements the Diesel manufacturer provides that the monthly payments shall be based on a minimum number of kilowatt-hours to be used by the purchaser each month. If the purchaser does not use this minimum number of kilowatt-hours in a certain month he is required to make a payment to the manufacturer based on the minimum number specified in the contract. In some of these agreements this seems to be the only point on which a concern takes any considerable gamble except, of course, on the question of the reliability of service as compared with purchased power.

In most instances the monthly payments are based on the power rate of the utility in effect at the time the contract is signed. However, in some instances, we have been informed that the manufacturer has agreed to reduce the monthly payments in the event the power rate is reduced at any time before the equipment is fully paid for.

In many cases the final sale price of equipment for a Diesel engine generating plant is materially less than the figure originally asked for by the Diesel manufacturer.

Insufficient capacity often recommended

In the majority of proposals made to prospective purchasers insufficient capacity is often recommended. The items of labor, maintenance and miscellaneous supplies are usually estimated too low in an effort to obtain low over-all costs. Situations involving small capacities of from 75 to 200 hp., particularly where high load factors are involved, require careful attention by power salesmen to insure proper consideration of total costs. Where direct-connected engine units can be used, such as in ice plants, the investment is materially lower than where motors and generators are installed. In addition, in plants of this size it is always debatable as to how much labor should be charged against the operation of the plant.

When dealing with loads of this size we often run into

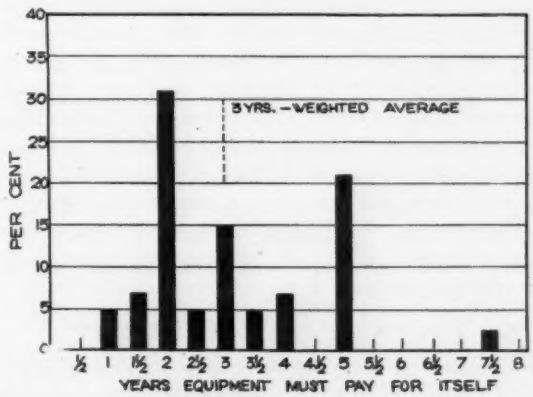


Fig. 3—Equipment policies of 39 industrial concerns

(From *Manufacturing Industries*, January, 1928)

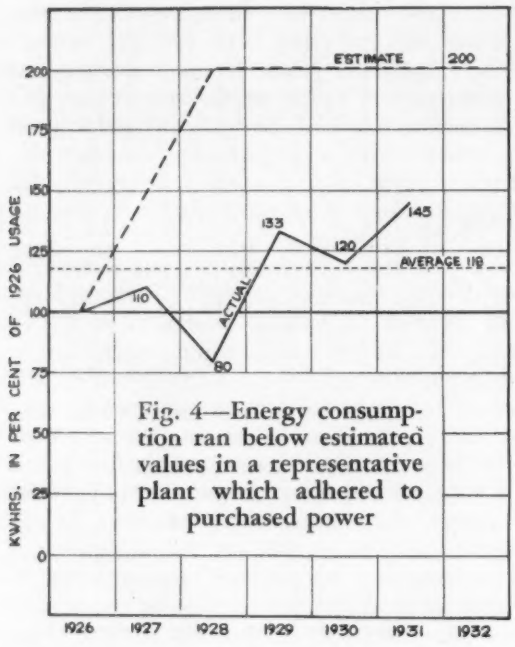


Fig. 4—Energy consumption ran below estimated values in a representative plant which adhered to purchased power

individuals who have little or no conception of the reality of interest and amortization charges. In many instances the customer has refused to consider fixed charges at all. In one case such an individual was persuaded to install an oil engine in a small ice plant, largely on the idea that if he would promote the sale of oil burners for heating purposes, he could so increase his purchases of fuel oil as to obtain cheaper oil for his engine!

For several years both the National Electric Light Association and the American Society of Mechanical Engineers have been publishing reports which give in most cases complete operating costs on a large number of plants. The N.E.L.A. report published last March on "Diesel Engine Power Costs" gave data on 251 plants and the latest report of the oil engine power committee of the A.S.M.E. covers 119 plants.

Skilled attendance needed

From median values of plants similar in size and load factor to those under consideration, fairly dependable values of operating cost items may be determined. The labor item requires careful analysis. Diesel manufacturers are claiming that very little if any labor is required and yet reputable consulting engineres have repeatedly made statements to the effect that for efficient and dependable operation of Diesel plants intelligent and skilled attendance is an absolute necessity. Louis R. Ford, consulting engineer, Brooklyn, N. Y., and present chairman of the executive committee of the Oil and Gas Power Division of the A.S.M.E., made the statement in June, 1929, in a discussion of a paper on Diesel engine plant refinements, that highly paid expert supervision is absolutely necessary for the satisfactory operation of a Diesel engine plant.

Equipment policy vitally important

The decision as to whether or not a piece of apparatus is to be installed by a particular concern depends entirely upon its so-called equipment policy. The most effective weapon power salesmen can now use against competition is a thorough knowledge and understanding of these policies and the ability to apply this knowledge intelligently in their negotiations with power users.

Equipment policy varies with the type of industry or undertaking, the character of the management of the individual concern and the present and prospective condition of business at the time the decision is made. The most comprehensive statement relating to this policy of installing equipment appeared in an article entitled "Can We Afford New Equipment?" published in the January, 1928, issue of *Manufacturing Industries*. An analysis of 39 industrial questionnaires discloses the fact that 44 per cent of the companies required that new equipment should return its cost through savings in a period of two years or less, and that 64 per cent required that it should pay for itself in three years or less. Only one specified a period in excess of five years. Other well-known concerns substantiate these results.

Last fall the chief engineer of one of the largest packers in this country told the Institute of American Meat Packers that he was sure his concern would not install a power plant during normal times unless it could pay for itself in four years. Another chief engineer declared that from 1927 to 1929 his company followed the policy of installing equipment which would pay for itself in from three to five years. "However," he added, "at present it is difficult to persuade my management to invest any money which will not be returned in one year or even less." In the ELECTRICAL WORLD of July 11, 1931, is found a statement by a representative of the Commercial Credit Company to the effect that in the field of financing eqiupment out of the earnings of the equipment his company limits its activities to three, or sometimes, as an exception, five-year terms.

These references indicate that successful concerns base their equipment policies on the economic life of apparatus and machines rather than on their physical life as is the practice of many of the manufacturers of competitive power-producing equipment when preparing estimates for prospective purchasers.

The selection of a period which represents the exact economic life of a piece of equipment is a very difficult, if not impossible, task. A review of all of the factors involved in the determination makes evident the extreme difficulty of predicting the future development or trend in any business over a period of years.

As an example of this, Fig. 4 has been prepared, which gives the actual experience of a medium-sized manufacturing plant. On account of an increased demand for its product this concern erected a new factory building to house its entire operation. At that time consideration was given to the economies possible through the installation of a Diesel plant instead of the continuation of a policy of purchasing power.

It was estimated that the energy requirements in the new building would be just double that taken in the old location during the year 1926 and comparative power costs were based on that premise. The chart shows that the actual usage has never exceeded 145 per cent of the energy used in that base year, and the average for five years has been only 118 per cent. Fortunately for it, this concern wisely continued to purchase its power.

Conservative judgment dictates that a relatively short period should be selected as the basis of the economic life of equipment. Extreme wisdom must also be exercised in selecting the rate of production used in determining

if the equipment will pay for itself in the selected period. If in the example just related the plant had been installed on the basis that it would pay for itself in five years, at the end of that period 41 per cent of the plant investment would have still been unpaid for.

If such an equipment policy is applied to the installation of power generating equipment, then it is evident that such a plant in competition with other sources of power supply must ordinarily pay for itself in not more than five years and often in a shorter period. This is sound business economics.

If a manufacturing concern has a liberal policy of investing in new equipment, if its entire purchase and installation price is returned in five years, then 16.7 per cent of the initial investment must be set up annually for this purpose on a sinking fund basis with interest at 6 per cent. When interest, taxes and insurance on the entire investment are added it is apparent that the total annual fixed charges for a generating plant in the average industrial establishment will be between 25 and 30 per cent.

A more representative equipment policy calling for amortization in three years would require annual fixed charges between 40 and 45 per cent.

Higher values of fixed charges justified

At present there is real justification for using higher values of fixed charges than were heretofore deemed adequate. Comment has already been made on the marked drop in commodity, fuel oil and oil engine prices and to the apparently stable unit price for purchased power. On this same chart have been plotted the average yields of high-grade bonds, preferred and common stocks over the same period. These curves show that, compared with the years of 1926 and 1927, capital today† requires from 35 to 90 per cent greater return. This means that if 6 per cent was deemed adequate interest at that time, from 8 to 11 per cent is required now in computing total fixed charges, and in many cases it will be found that concerns have modified their equipment policies by reducing materially the period in which equipment must pay for itself out of savings.

How many power salesmen become intimately acquainted with equipment policies and how are they practically applied? An excellent plan is for them to discuss the subject with the managing executives of their own companies. Those who occupy these positions are called upon almost daily to exercise judgment relative to equipment policies. Let the power salesmen ask for the privilege of masquerading as a representative of a company selling, say, ash-handling or coal-handling equipment and trying to sell his product based on its savings. Such an experience would be instructive regarding equipment policies.

Knowledge of a power user's equipment policy is perhaps the greatest aid in meeting the so-called "pay-out-of-savings" proposals offered by many Diesel manufacturers today. If the power user requires new equipment to pay for itself in three years, he will probably not be interested in a Diesel plant that will require five years for complete payment. In these cases the power salesman must ascertain that all proper operating costs are included in determining the balance available for payment for the engines. If after this has been done the equipment can be paid for within the period covered by the power user's equipment policy, then a serious competitive situation results. In cases such as this the utility should be prepared to offer the purchaser a similar financing plan for the purchase of equipment to utilize purchased power.

†July, 1932.

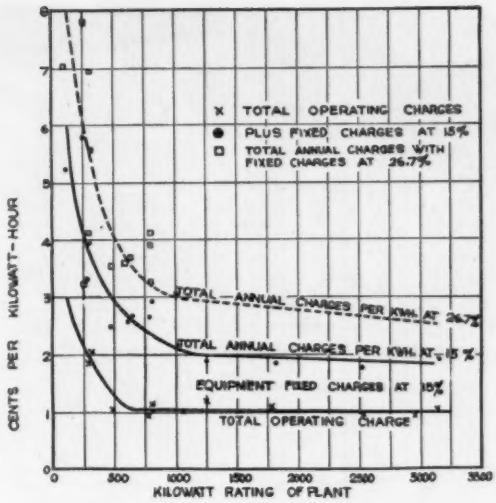
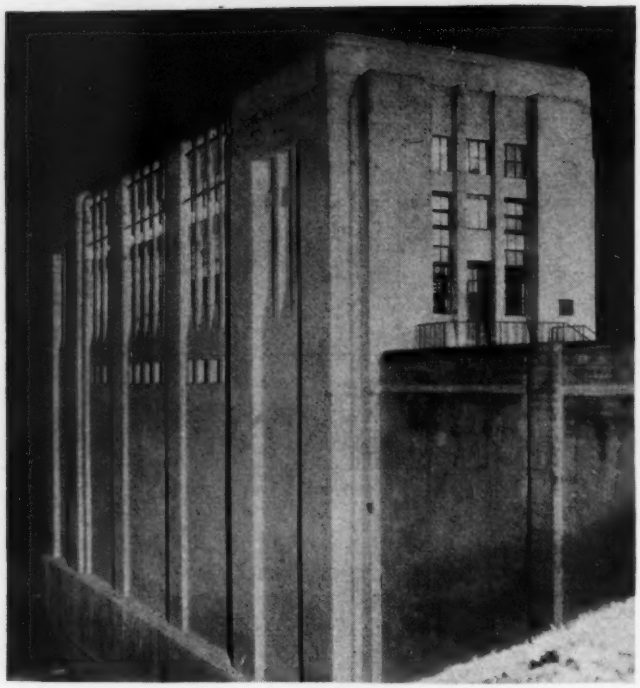


Fig. 5—Operating costs and fixed charges of various sizes of Diesel plants
(From ELECTRICAL WORLD, July 9, 1932)

In ELECTRICAL WORLD, July 9, 1932, page 51, appears an article on Diesel power costs based on data in the 1930 report of the oil engine costs committee of the A.S.M.E. A summary is given of eighteen plants with full detail on capital outlay and operating expenditures. The load factors of these plants are between 25 and 40 per cent. From a curve plotting operating costs per kilowatt-hour and fixed charges at 26.7 per cent against plant capacity the conclusion is drawn that individual plants from 1,000 to 2,500 kw. of capacity, having load characteristics similar to municipal plants, cannot expect costs to fall below a range of 2.5 to 3 cents per kilowatt-hour unless favored by lower oil, labor and initial plant outlays than prevailed in 1930 and 1931. From another curve using 15 per cent fixed charges, the statement is made that municipal plants of the same range will have unit costs of at least 1.7 to 2.2 cents per kilowatt-hour. Plants below 1,000 kw. have increasingly higher unit costs. This curve demonstrates effectively the predominating influence of fixed charges on total power costs.

In conclusion, let me emphasize the importance today of following a definite plan of systematic visits to power customers. When one considers the number of concerns engaged in the manufacture of power-generating equipment who are actively interested in our power business, the need for regular contacts with customers is apparent. I believe the time has come when it is essential that each power company adopt a system whereby there is checked assurance that every power customer is called upon regularly.

Where a basis of confidence has been built up with customers through these personal contacts it will form the soundest foundation for successfully meeting the most serious competition.



Little Water Passes Eagle Pass Unused

By L. F. HARZA

Harza Engineering Company, Chicago

MORE than is usually the case in hydro-electric plant operation, it is necessary for the new Eagle Pass station of the Central Power & Light Company in southern Texas to make the fullest possible use of the water available to it. The reason for this rigid compulsion is that this hydro-electric development is very closely associated, both financially and physically, with an extensive irrigation project and the operation of either one is directly reflected in the other. Therefore an easily discernible factor of dominating importance in the design of Eagle Pass is continuity of operation.

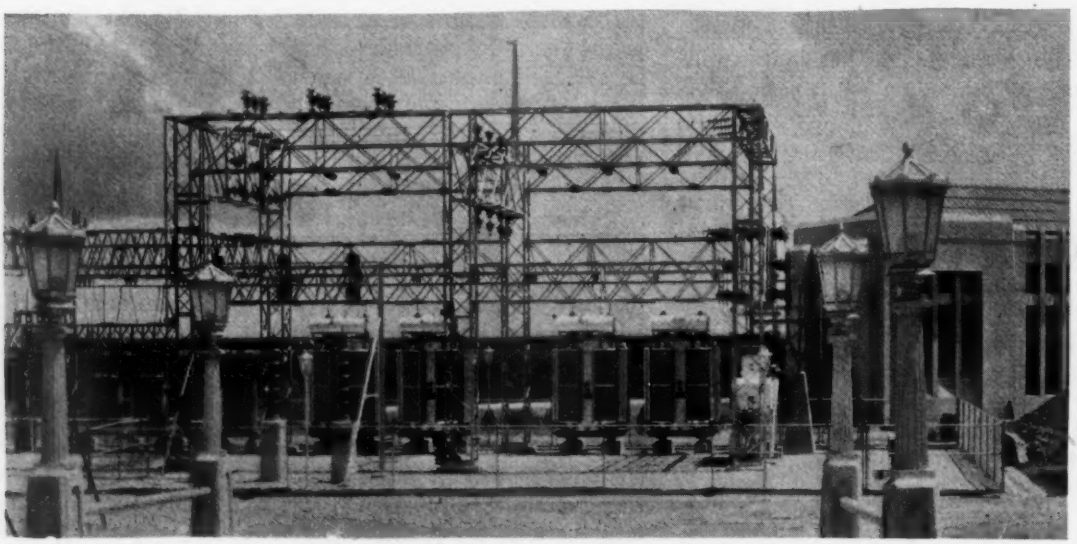
Water for the development is obtained from the main irrigation canal of the Maverick County Water Control and Improvement District No. 1, which at this point swings to within 1,500 ft. of the Rio Grande at an elevation of about 85 ft. above low water stage. Water is diverted from the Rio Grande and flows through about 32 miles of canal to the point of delivery, where the district has provided a check structure and head works for the power canal. The designed capacity of the irrigation canal above the power canal diversion is 1,500 c.f.s. and the proposed extension below this point will have a capacity of 500 c.f.s. Outside of the irrigating season it is contemplated that 1,500 c.f.s. will be delivered for power. This combined use of the canal for irrigation and power purposes contributed largely to the economic feasibility of the project.

There is no pondage along the canal such as would permit operation at variable load, or the shutting down of a unit more than momentarily when water is available. As water available for power must be paid for when wasted, these conditions made it imperative that the maximum operating reliability be obtained. Accordingly three 4,000-kva. units were installed in the power house, permitting one to be off the line for inspection or repairs during periods of low flow. All mechanical features throughout were made as reliable and as accessible as possible to encourage proper maintenance and to facilitate repairs when necessary.

Some of the features of the station are brought out in the accompanying illustrations and captions. Others, not illustrated, are worthy of mention. Among them are the station ventilation and the turbine governors.

Ventilation is accomplished by drawing cooling air for the generators in through the windows. The generators discharge into a duct, from which the heated air passes to outdoors through louvers in the downstream side of the building. An exhaust fan pulls the air from the lower substructure floors to which fresh air is sup-

(Continued on page 501)

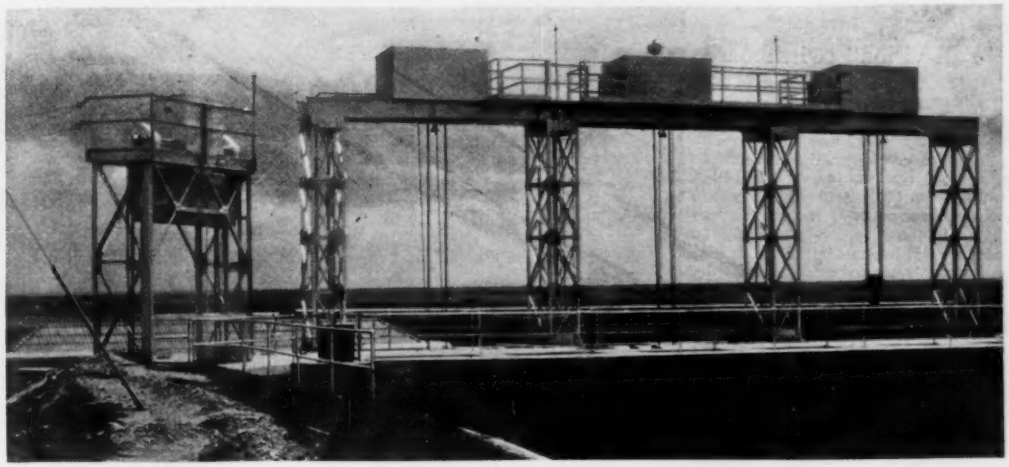


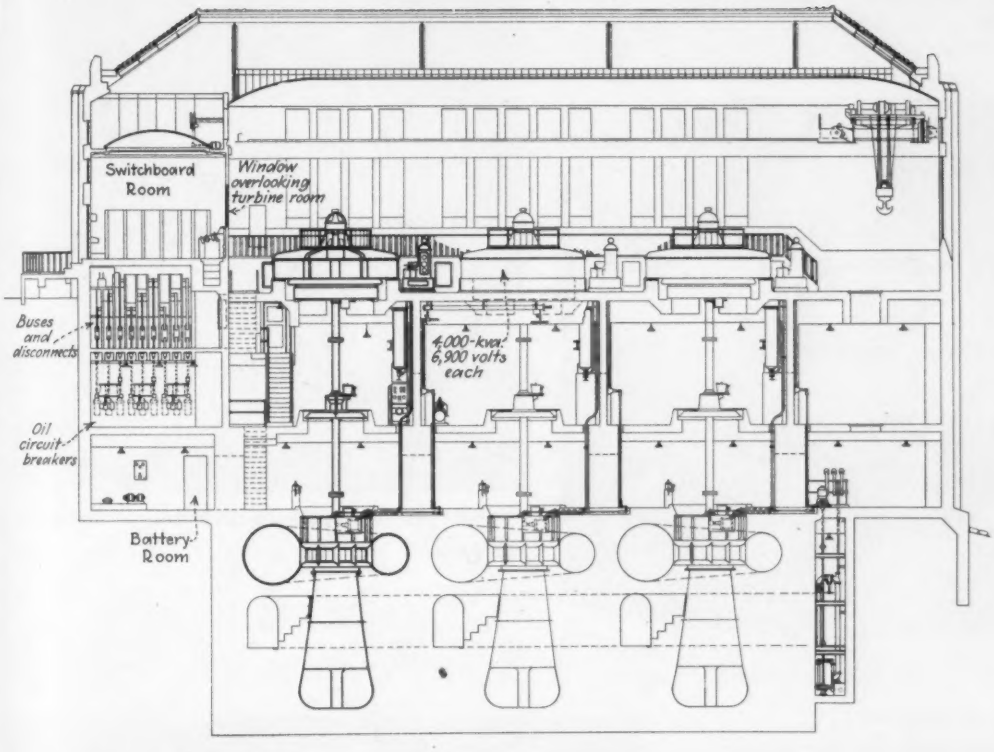
From Eagle Pass to the C.P.&L. system

Power generated at 6,900 volts is stepped up to 66 kv. in one transformer bank of 12,000 kva. and another of 1,500.

Head and spillway gates

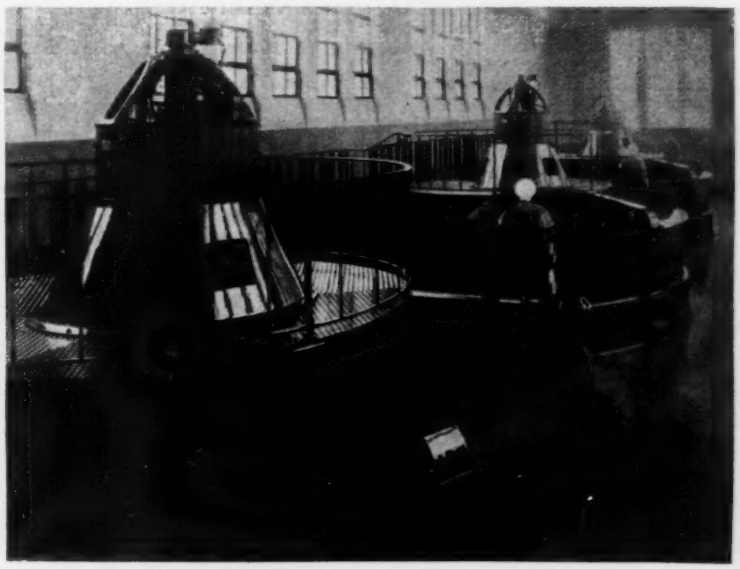
The headgate hoists are motor-operated and push-button controlled from the switchboard room. The Tainter gate in the spillway is overbalanced by a concrete counterweight. The hoist is motor-operated and normal control is automatic through a float and electrical contacts. A small rise in headwater above normal will raise the float sufficiently to make a contact, whereupon the gate raises a small amount and breaks the contact. If the headwater continues to rise the operation is repeated in steps or if the headwater falls the operation is reversed. The automatic control may be superseded by manual push-button control from the switchboard room or from the platform above the gate. Normally the gate is held in any position by a solenoid brake acting against the excess torque of the counterweight. In case of entire power failure at a time when the gate must be opened the solenoid brake can be tripped mechanically. As a further provision against the possibility of water overtopping the canal banks a way for automatic opening is provided. In one of the side walls is a chamber communicating with headwater and in which is a small weir with the crest about 2 ft. below the top of the canal banks. Should water ever reach this elevation it will pour over the weir into a bucket attached to a lever on the solenoid brake. A sufficient weight of water in the bucket will trip the solenoid, when the excess load in the counterweight will hoist the gate. In order to prevent the counterweight from coasting at excessive speed a fan with a damper in the casing outlet is direct connected to the driving shaft of the hoist. The braking effect of the fan can be readily adjusted and is normally set to limit the coasting speed of the counterweight to 2 ft. per minute.





Uncluttered design characterizes Eagle Pass

Instead of being supported on concrete barrels carried by the turbine speed rings the generators are supported on heavy beams carried by the walls. This proved to be the more economical means of support on account of the great height between the turbine and generator floors, and at the same time the intermediate floors remain roomy and unobstructed.

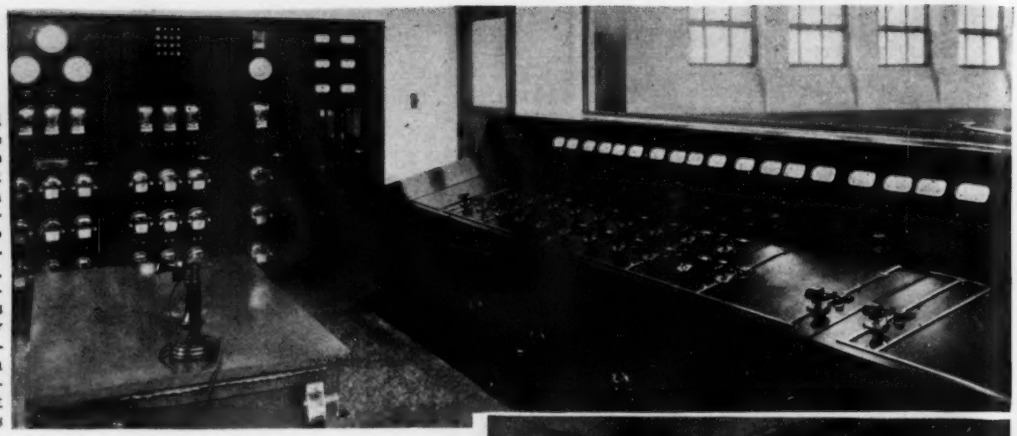


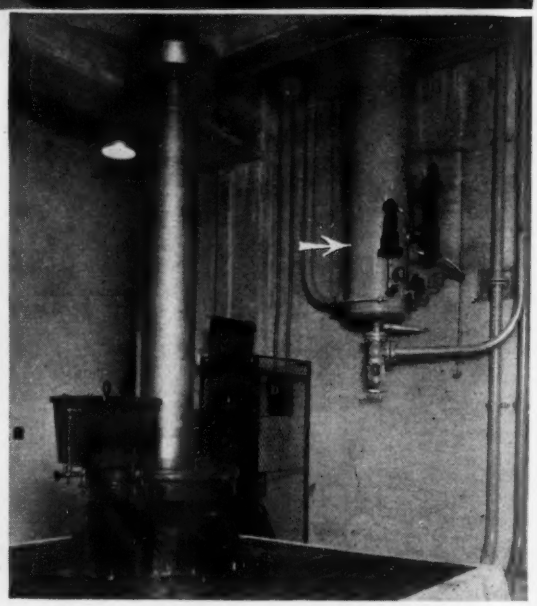
Umbrella type generators

Umbrella type generators (Westinghouse) having a combined thrust and guide bearing below the rotor are used. Each machine has a capacity of 4,000 kva. at 0.8 power factor; generation is at 60 cycles and 6,900 volts. Welded construction was used throughout, but particular care was exercised to secure proper proportions and a pleasing exterior appearance.

"Full vision" switchboard room

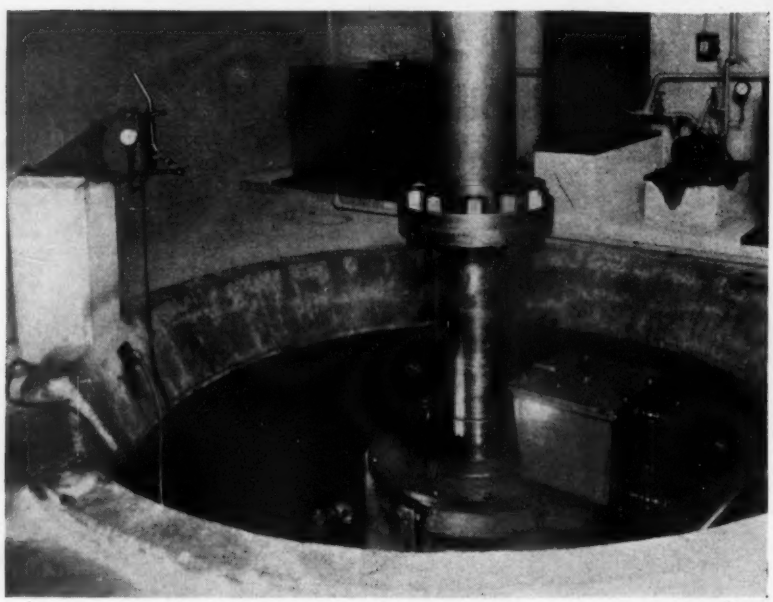
In planning the switchboard room and its equipment the principal considerations were to place all operations of the plant under control and observation of one operator with no necessity for leaving his post and to make all instruments and circuits convenient and accessible. How well these objects were attained is apparent from this picture. The meter and relay board in the background is recessed flush with wall and each panel is hinged to swing outward for accessibility. Indirect lighting is provided by lamps concealed behind a cover in switchboard room and behind crane girder in generator room. The light is reflected from curved ceiling to floor, giving a pleasing and adequate distribution of light.





Governor oil-pressure tank below the floor

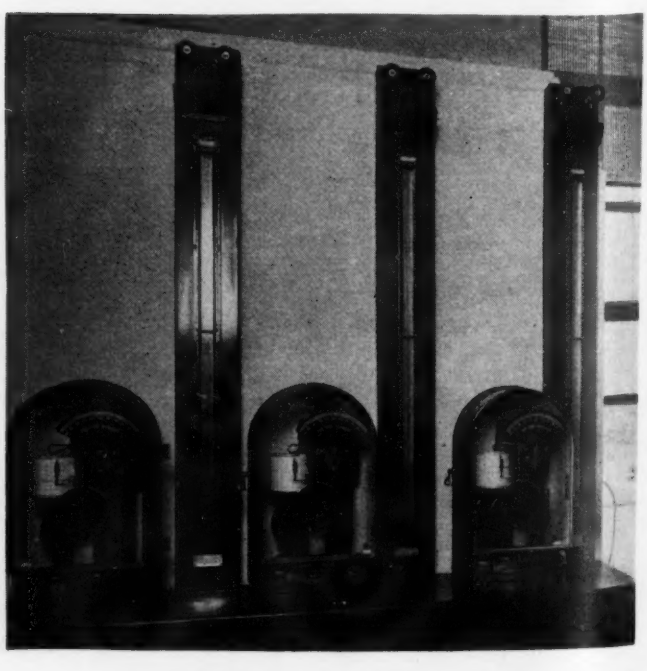
One reason why the generator room has an uncluttered appearance is shown by this view of the intermediate bearing level. Putting these tanks below the generator floor was facilitated by the "Teldicator" devices (black against the lighter colored tank) by which oil pressure and oil level are indicated at governor and on switchboard panel.



Easy access to the turbines

The gate-shifting ring is located on the inside circumference of the pit liner instead of around the bearing as is customary. This leaves the pit unobstructed and permits ready access to the turbine bearing without dismantling the shifting mechanism. The turbines are the vertical direct-connected type with Francis runners (Leffel) having a specific speed of 62 r.p.m. Each runner is rated at 4,500 hp. under 81-ft. head at a speed of 225 r.p.m.

A new feature in this installation is shown at the left. This is the Farvel unit lubrication system for one-shot greasing of all points on the gate stems, links and shifting ring. The grease gun is mounted above the pit liner and from this high-pressure tubing leads around the turbine pit to all fittings. In a very short time an operator can pump the gun to any desired pressure, up to 1,000 lb., and an automatic release provides lubrication at a great saving in the time and labor which would be required to give each of the 80 fittings on each turbine an individual shot.



Counting the cubic feet per second

Simplex meters integrate and record water flows through each turbine. They show the amount of water purchased from the irrigation district. Another feature of these instruments is the use of tetrabrom-ethane in place of mercury in the manometers to give a larger reading scale.

plied through grilles in the generator floor. During cold weather the outside louvers in the discharge duct may be closed and sufficient warm air recirculated through registers into the power house. The air is taken in at the top of the generator near the shaft and discharged outward through the coils into a plate steel duct which surrounds, and forms an integral part of, the machine. This duct, in turn, discharges into the masonry duct before referred to in connection with the power house ventilation. This system of cooling has two principal merits: The hot blast of air directly from the machine into the power house is avoided and the cooling air does not pass any source of oil, with the attendant danger of oil vapor being passed through the coils.

The governors are of the vertical actuator type (Woodward), located on the floor beside the generators. Each is provided with individual pump, pressure tank and sump, the sumps being incorporated in the pump bases and the pressure tanks being suspended beneath the generator floor for the sake of appearance and to economize floor space. The governor flyballs are motor-driven by power from a pilot exciter on the generator main shaft. Dual control is used for controlling the gate opening and setting the gate limit stop so that either of these adjustments may be made by the operator, remotely from the switchboard, where an instrument indicates both, or directly at the actuators.

Location of the pressure tanks below the generator floor does not permit direct reading of the oil pressure and level. Therefore, remote-indicating pressure and level gages were installed on the tanks with duplicate indicators on the actuator column and on the switchboard. They are arranged so that oil level is ordinarily indicated, but by pushing a button, oil pressure is indicated on a second scale by the same instrument. As the usual tachometer on top of the actuator column could not be read from the switchboard room and as frequency will indicate the speed of a unit at all times, the tachometer was replaced with a lamp on each actuator which lights when the flyballs are up to speed and indicates to the operator when the governor takes control.

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Synchronizing Out on the Line

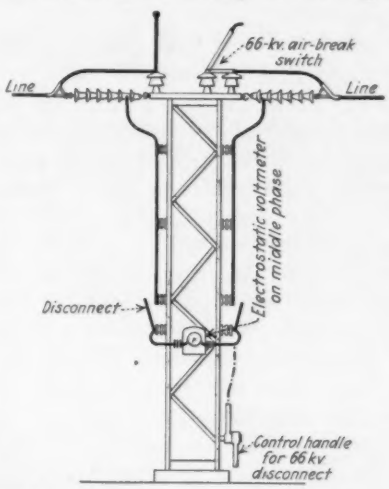
By STANLEY GILMORE
Columbia, Mo.

One of the problems that appears when operating an extensive and lightly loaded transmission system is that of restoring tie-line interconnections after they have been broken by line fault. It is common practice to locate such a fault by cutting out section after section of the line with air-break switches and applying voltage to see if the fault has been removed. This causes several interruptions to any load that may be connected to the tie line, but a very lightly loaded system cannot justify the expense for relays and automatic circuit breakers that would be necessary for better service. After the fault has been located, service can usually be restored to all customers, while the defective section of line is isolated and repaired.

When repairs are complete the problem is that of completing the interconnection again. In the majority of cases the defective section of line has been isolated by air-break switches, and the process of juggling loads and line connections until final system closure can be made at a point where synchronizing equipment is available causes more interruptions and perhaps results in straining equipment because of overload or abnormal voltage.

A scheme that would permit synchronizing directly at the original break would be much more satisfactory.

The Empreza Forca e Luz de Ribeirao Preto, operating subsidiary of the American & Foreign Power Company, Inc., in the State of São Paulo, Brazil, has discovered that a simple arrangement will permit synchronizing across the gang-operated air-break switches commonly used for line sectionalizing. The "in-phase" indication is taken from an electrostatic voltmeter connected across the switch on any one phase. The caps of the second strain insulators away from the tower in the dead-end strings are used as condensers for the voltmeter. When the air-break switch is open the needle of the electrostatic voltmeter swings from zero to a maximum and back to zero as the voltages on either side of the switch pass in-phase, out-of-phase and in-phase again. There is no difficulty in closing the air-break switch in time to catch an in-phase condition. Any slight adjustment in system speeds before synchronizing can be obtained by the use of the transmission line telephone. These are not usually necessary, however, it being only necessary to advise the various power stations that the interconnecting switch is about to be closed.



Scheme for synchronizing across air-break switch

The cost of 66-kv. synchronizing equipment indicated here will be about as follows:

1 static voltmeter	$50
1 weatherproof housing for meter	5
4 15-kv. bus supports for leads	20
2 15-kv. knife disconnects	40
Incidentals, labor and overhead	50
Total	$165

The electrostatic voltmeter used in Brazil is a German-made instrument with a scale of about 0-10,000 volts. American manufacturers doubtless make a similar instrument. Their representatives have suggested that the ordinary 110-volt, low-wattage Edison base neon glow lamp could be used in place of the static voltmeter, closing the synchronizing switch on the dark lamp. This may offer possibilities, but the Brazilian company was not able to arrange a circuit so that the glow of the neon tube would come and go in a positive manner. The electrostatic voltmeter, giving a positive and easily read indication, was considered more satisfactory.

Power Must Be Cheap for Electrochemical Industry*

By C. L. MANTELL
Consulting Engineer, Brooklyn, N. Y.

Value of materials electrochemically produced, excluding metals electrolytically refined, amounts to $350,000,000 to $400,000,000 annually, or 10 per cent of the output of all of the chemical and chemical engineering plants or process industries.

Power is an important raw material for the electrochemical industries. The energy requirements for various products differ widely. For the more important substances the power needs, production per unit of power and the operating voltages of the tank or cell are tabulated in Table I. These figures represent approximately present-day plant practice, as they have been gathered through the courtesy of the operating companies manufacturing the substances.

The calculated installed power for the products included in the table is well over 1,000,000 kw. When industries of minor importance not in Table II are included—electroplating and similar plants, stand-by equipment, units used only portions of the day, as well as other types of power machinery—it is estimated that the total installed power for electrochemical industries is larger than 3,000,000 kw.

The electrochemical industries must have cheap power. This has been said so often that it has come to be regarded as axiomatic. In Table IV the percentage of the total price of various materials at different power costs has been calculated. With power at ½ cent a kilowatt-hour, one-fifth of the value received for a pound of sodium is necessary to pay the power bill, while at 1 cent per kilowatt-hour, almost two-fifths of what is received for the sodium goes to the power plant. Even larger figures are noted at the same power costs in the case of aluminum and magnesium, and obviously these industries must have power cheaper than ½ cent per kilowatt-hour. In the case of electrolytic zinc, a similar situation holds and we find the electrolytic zinc plants which are successful from the financial side are located at centers of cheap power. When a chlorine manufacturer has to pay ½ cent and up for his power he generally doesn't stay in the chlorine business very long. At present prices of 2 cents a pound 1½ cents would go to the power company if power were purchased at 1 cent per

**Excerpts from paper "Economical Importance of the Electrochemical Industries," presented before the Electrochemical Society in Cleveland, Ohio, September 22-24, 1932.*

Table I—Energy Consumption of Electrochemical Products

	Kw.-Hr. per Lb.	Lb. per Kw.-Hr.	Voltage per Tank, Cell or Furnace
Alumina, fused	1 – 1.5	0.67– 1	100 –110
Aluminum	10 –12	0.08– 0.1	5.5 – 7
Cadmium	0.8	1.25	2.6
Calcium	22 –24	0.04	
Calcium carbide	1.3 – 1.4	0.71– 0.77	
Carbon bisulphide	0.4 – 0.5	2 – 2.5	60
Caustic, diaphragm cells	1.16 – 1.43	0.68– 0.86	3.4 – 4.2
Caustic, mercury cells	1.45	0.69	4.1 – 4.3
Chlorine, diaphragm cells	1.3 – 1.6	0.62– 0.76	3.4 – 4.2
Chlorine, mercury cells	1.6	0.62	4.1 – 4.3
Copper, electrorefining:			
Multiple system	0.09 – 0.16	6.3 –11	0.18– 0.4
Series system	0.074	13.5	16 – 18
Copper, electrowinning	1 – 1.5	0.67– 1	1.9 – 2.4
Ferrochromium, 70 per cent	2 – 3	0.33– 0.5	90 –120
Ferromanganese, 80 per cent	1.5 – 3	0.33– 0.67	90 –115
Ferromolybdenum, 50 per cent	3 – 4	0.25– 0.33	50 –150
Ferrosilicon, 50 per cent	2 – 3.5	0.28– 0.5	75 –150
Ferrotungsten, 70 per cent	1.5 – 2	0.5 – 0.67	90 –120
Ferrovanadium	2 – 3.5	0.28– 0.5	150 –250
Gold	0.15	6.6	1.3 – 1.6
Graphite	1.5 – 2.0	0.67	80 –200
Iron	1.8 – 2.0	0.5 – 0.55	4 – 4.4
Lead	0.04 – 0.05	24	0.35– 0.6
Magnesium, chloride process	8 –13	0.08– 0.125	6 – 9
Magnesium, oxide process	14 –25	0.04– 0.07	9 – 16
Nickel	1.1	0.9	2.4 – 2.5
Phosphorus	4 – 5.5	0.18– 0.25	
Silico-manganese	2 – 3	0.33– 0.5	90 –120
Silico-carbide	3.2 – 3.85	0.26– 0.31	75 –230
Silver, Moebius	0.31	3.2	2.7
Silver, Thum	0.41	2.4	3 – 3.5
Sodium	7.1 – 7.3	0.13– 0.14	
Steel, cold charge	0.25 – 0.4	2.5 – 4	85 –225
Steel, hot charge	0.05 – 0.2	5 –20	75 –100
Tin	0.085	11.8	0.3 – 0.35
Zinc	1.4 – 1.56	0.64– 0.7	3.5 – 3.7

Table II—Production, Volume and Power Installations of Major Electrochemical Products

Product	Production in Tons (000 Omitted)	Value per Unit	Total Value (000 Omitted	Power Kw.-Hr. per Ton	Total Kw.-Hr. Needed x 10^6	Kw. Installed
Sodium	10,000 (a)	$0.19	$1,900	7.2 (b)	72	10,000
Aluminum	229,000 (a)	0.22	50,380	12 (b)	2,748	380,000
Magnesium	1,300 (a)	0.30	390	13 (b)	17	2,500
Copper	1,500	.....	.....	220	330	46,000
Cadmium	2,800 (a)	0.64	1,780	0.8 (b)	2.3	320
Zinc	131	90.00	11,790	3,000	393	54,600
Chlorine	500,000 (a)	0.02	10,000	1,5 (b)	800	111,250
Caustic	840,000 (a)	0.025	21,000			
Carbide	400	100.00	40,000	3,000	1,200	170,000
Silicon carbide	30	100.00	3,000	7,500	225	31,000
Graphite	40,000 (a)	0.07	2,800	1.8 (b)	72	10,000
Fused alumina	50	90.00	4,500	3,500	175	23,000
H_3PO_4	41,412 (a)	0.09	3,700	0.8 (b)	33	4,400
Ferrosilicon	174	35.00	6,090	5,000	870	121,000
Ferrochromium	25	200.00	5,000	4,000	100	14,200
Electric steel	803	60.00	48,180	500	402	54,200
White lead	10	150.00	1,500	450	4.5	500
						1,041,970

(a) Pounds instead of tons. (b) Kilowatt-hours per pound.

Table III—Power Costs at Electrochemical Centers

Locality	Type of Plant	Power Cost Mills per Kw.-Hr.
Alabama	S	3.8–6
Anniston, Ala	S	5
Arvida, P. Q	H	1 –1.5
California	S	3.8–6
England	S	4 –5
French Alps	H	2 –3
Germany	(a) S	3.5–4
Great Falls, Mont	H	3 –4
Kanawha Valley, W. Va	SH	4 –8
Massena, N. Y	H	3.8
Niagara Falls, N. Y	H	3 up
Norway	H	1 –1.5
Ontario, Canada	H	1.5–4
St. Louis	S	4 –5
Scotland	H	3 –4
Shawinigan Falls, P. Q	H	1 –1.5
Sweden	H	1 –1.5
Switzerland	H	3
Tennessee	S	3.8–6

S = Steam. H = Hydro. (a) Brown coal.

Table IV—Price-Power Cost Relations for Electrochemical Products

Product	Price per Unit	Power, Kw.-Hr. per Unit	Power Cost at 0.1 ct. per Kw.-Hr.	Per Cent of Price	Power Cost at 0.2 ct. per Kw.-Hr.	Per Cent of Price	Power Cost at 0.3 ct. per Kw.-Hr.	Per Cent of Price	Power Cost at 0.5 ct. per Kw.-Hr.	Per Cent of Price	Power Cost at 1 ct. per Kw.-Hr.	Per Cent of Price
Sodium	19 cts./lb.	7.2	$0.007	4.	$0.014	7.6	$0.022	11.4	$0.036	20.0	$0.072	38.0
Aluminum	22 cts./lb.	12.0	0.012	5.5	0.024	11.0	0.036	16.0	0.06	27.0	0.12	55.0
Magnesium	30 cts./lb.	13.0	0.013	4.3	0.026	8.6	0.039	13.0	0.065	22.0	0.13	43.0
Copper	$160/ton	220.0	0.22	0.14	0.44	0.3	0.66	0.41	1.10	0.7	2.20	1.38
Cadmium	64 cts./lb.	0.8	0.0008	0.125	0.0016	0.25	0.0024	0.375	0.004	0.625	0.008	1.25
Zinc	$90/ton	3,000	3.00	3.3	6.00	6.6	9.00	10.0	15.00	16.6	30.00	33.0
Chlorine	2 cts./lb.	1.5	0.0015	7.5	0.003	15.0	0.0045	22.5	0.0075	37.5	0.015	75.0
Carbide	$100/ton	3,000	3.00	3.	6.00	6.0	9.00	9.0	15.00	15.0	30.00	30.0
Silicon carbide	$100/ton	7,500	7.50	7.5	15.00	15.0	22.50	22.5	37.50	37.5	75.00	75.0
Graphite	7 cts./lb.	1.8	0.0018	2.6	0.0036	5.1	0.0054	8.0	0.009	12.7	0.018	25.7
Fused alumina	$90/ton	3,500	3.50	4.	7.00	7.8	10.50	11.7	17.50	20.0	35.00	39.0
H_3PO_4	9 cts./lb.	0.8	0.0008	0.9	0.0016	1.8	0.0024	2.7	0.004	4.4	0.008	9.0
Ferrosilicon	$35/ton	5,000	5.00	14.3	10.00	28.6	15.00	43.	25.00	71.4	50.00	143.0
Ferrochromium	$200/ton	4,000	4.00	2.	8.00	4.0	12.00	6.0	20.00	10.0	40.00	20.0
Electric steel	$60/ton	500	0.50	0.8	1.00	1.66	1.50	2.5	2.50	4.16	5.00	8.3
White lead	$150/ton	450	0.45	0.3	0.90	0.6	1.35	0.9	2.25	1.5	4.50	3.0

kilowatt-hour. Were the ferrosilicon manufacturer forced to pay 1 cent a kilowatt-hour for his power he would pay the power company nearly 1½ times as much for the power to make ferrosilicon as he would get for the ferrosilicon. Even at $\frac{3}{10}$ cent per kilowatt-hour, the power cost is a very large item in the case of most products. Small wonder the electrochemist is constantly looking for low cost kilowatt-hours. Many electrochemical centers have low power costs.

From 93 to 94 per cent of the copper, 25 to 30 per cent of the zinc, more than 75 per cent of the cadmium, 83 per cent of the silver, probably 100 per cent of the bismuth output of the United States are the product of the electrolytic cell. In Canada about 30 per cent of the nickel and all of the cadmium are electrolytically produced. All of the chlorine in the United States, about 30 per cent of the caustic and 7 per cent of the white lead pigment are produced electrolytically, all of these in competition with other methods. The power requirements for refining do not bulk large because of the relatively low power needs per unit.

Table V—Refinery Capacity and Power Installation for Electrolytic Copper

Country	Refinery Capacity (Tons)	Power per Ton (Kw.-Hr.)	Power per Year (1,000 Kw.-Hr.)	Kw. Installed
United States	1,781,000	220	391,820	45,350
Canada	195,000	220	42,900	4,970
South America	365,000	3,000	1,095,000	126,740
Japan	129,500	220	28,490	3,300
Germany	140,000	220	30,800	3,570
Belgium	121,000	220	26,620	3,080
Total	2,731,500		1,615,630	187,000

Table VI—Refinery Capacity and Power Installation for Electrolytic Zinc

(All on basis of 3,000 kw.-hr. per ton)

Country	Refinery Capacity (Tons)	Power per Year (1,000 Kw.-Hr.)	Kw. Installed
United States	231,400	694,200	80,350
Canada	163,400	490,200	56,740
France	50,400	151,200	17,500
Germany	1,200	3,600	420
Italy	24,000	72,000	8,330
Norway	40,000	120,000	13,900
Poland	30,000	90,000	10,420
Australia	79,000	237,000	27,430
Rhodesia	22,000	66,000	7,640
Total	641,400	1,924,200	222,700

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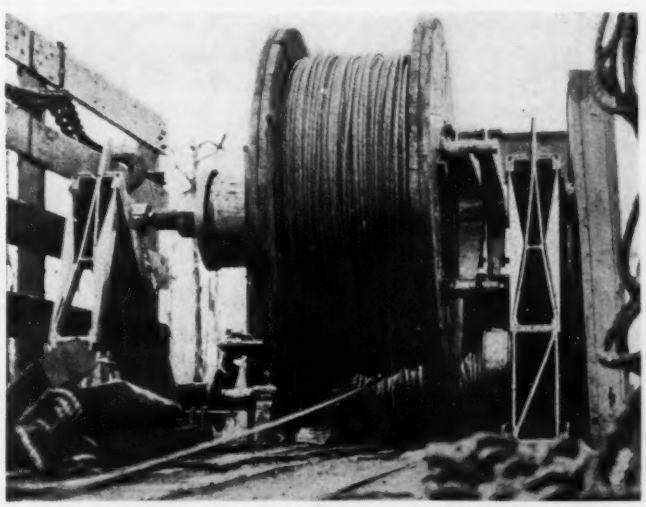
Power Take-up Reel for Wire Salvage

By FRANK S. CLARK
Superintendent of Construction
Penn Central Light & Power Company, Altoona, Pa.

Salvaging of wire presents a problem. Take-up reels as marketed are small, generally built for hand coils of telephone wire, so a heavy-duty reel for power wire has been devised.

Recently it was found necessary to pull out and salvage approximately 14 circuit-miles of No. 2/0 bare stranded wire. This wire was strung on steel towers over rough country, with few roads leading in to the right-of-way. Since it was desired to restring this wire elsewhere the



Hinged reel jack speeds up wire salvaging

Housing at extreme right covers sprocket and chain which drives reel from power winch. Toggle joint jack lifts and lowers reel in short time.

number of sleeves should not be increased by cutting to short lengths.

Negotiations were conducted with the Utility Supply Company, Clintonville, Wis., and, jointly with it, a heavy-duty power reel was evolved for handling a mile of wire. The reel was designed in such a manner as to make it easy and quick to remove a loaded reel and install a new empty one by the following means:

The reel spindle was supported on two reel jacks, each of which was jointed at the center of the strut leg and operated by means of the lever, which, when fully raised, passed beyond the dead center, holding the reel in place. It is only the work of a second to raise or lower the reel.

The reel is placed on a hollow shaft and held there by means of a nut and a large washer. A driving spider is attached to the end of the shaft and driving points on this spider are forced into the reel by means of a nut. This spider engages pins in the live or driving spider for power. Through this hollow shaft the dead axle or spindle is run to support the driving shaft.

With the jacks lowered, it requires but a few minutes to withdraw the dead spindle and roll the loaded reel clear. Once clear, the nut is backed off the hollow shaft and this is withdrawn and placed on a new reel.

The live or driving spider is mounted on a hollow shaft, on the outboard end of which is a chain sprocket. This is driven from the shaft of the winch by means of a roller chain and sprocket installed on the shaft of the winch already on the truck.

The operation consists of taking a load of empty reels into the right-of-way wherever roads permit. The wire is untied and dropped to the ground. One end is attached to the reel and the reel started. One man runs the truck and the second man examines the wire for damaged places as it passes by him. This man also guides the wire on the reel in order to get the wire run on smoothly. Due to tension on the wire it is possible to reel the wire tightly and evenly. It is possible to reel on wire equivalent to the quantity originally on the reel. This is never possible when the slack is pulled in the wire and then the wire reeled up. After the reel is filled it is removed from the spindle and rolled to the side of the truck. When all reels are filled the truck moves out to some point easily accessible and unloads.

This method of work eliminates the use of three horses and also does a better job. It also eliminates hazards due to wire being jerked, with the possibility of swinging up into live conductors, particularly on long spans.

There have been developments similar to this for the same type of work, but many have been bulky and cumbersome. This development is small, compact and powerful and increases very materially the efficiency of this class of work.

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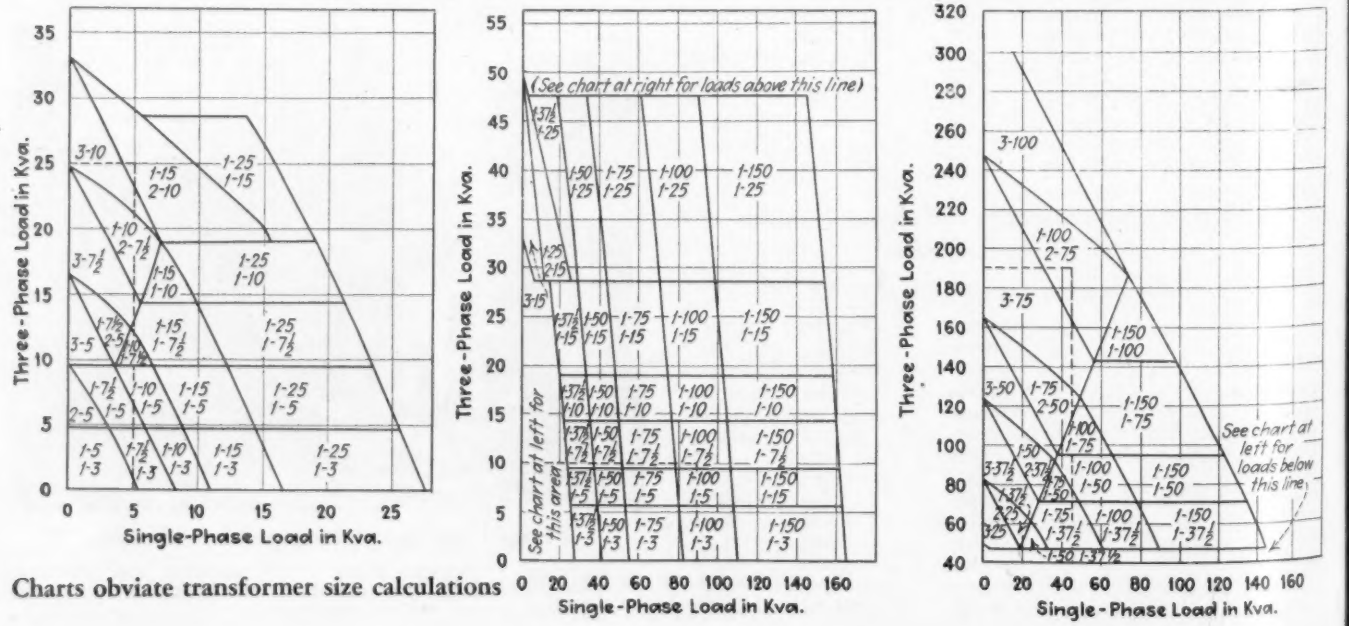
Distribution Transformer Sizes for Mixed Loads

By A. R. KNIGHT and R. O. ASKEY

Department of Electrical Engineering, University of Illinois, and Public Service Company of Northern Illinois, Chicago, Respectively

Sizes of transformers and type of connection for serving a given combined single- and three-phase demand are determined directly without tedious calculations or graphical vector solutions in the Public Service Company of Northern Illinois. The charts used were constructed by plotting curves of the maximum loads that different sizes of transformers could carry when connected as either power or lighting transformers for an open Y or Y-delta connection.* The multiplicity of curves so plotted formed areas which were labeled with the sizes of transformers, the curves of which comprised the upper and right boundaries of the area. The charts were constructed on the basis of loading transformers to 110 per cent of their rating and on the principle that the choice of connection should be such as to require a minimum of transformer capacity. With power factors of 0.80 lag for the three-phase load and 0.95 lag for the single-phase load, adherence to this principle dictates the use of open-Y connection for ratios of three-phase to single-phase load less than 2.56 and the Y-delta connection for higher ratios of three-phase to single-phase load. Three charts are used instead of one merely to enlarge the scale for the smaller-sized transformers.

**See "Electrical World," page 313, September 3, 1932, for a discussion of study that determined as most economical the open-Y with lighting load on the phase leading the power transformer.*


Three-Phase Load in Kva.
Single-Phase Load in Kva.
(See chart at right for loads above this line)
See chart at left for this area
See chart at left for loads below this line

Charts obviate transformer size calculations

Manufacturers Announce Policy on Regulatory Legislation

AT THE convention of the National Electrical Manufacturers' Association last week the board of directors passed a resolution approving a statement of policy respecting regulatory legislation affecting the electrical industry. The statement of approved policy is as follows:

From the beginning of his co-ordinated thinking the electrical manufacturer has recognized that the industry would be subject to regulation in its relation to the public by reason of the existence of a potential fire and casualty hazard, and irrespective of the actual degree of hazard incorporated. Further, he realized that such legislation would, in all probability, follow the history of all regulatory enactment and be extended in scope far beyond the original concept of what would be necessary.

Accepting these considerations as basic, he has at no time endeavored either to forward or to oppose such legislation, but when it has been proposed has attempted merely so to guide it as to assure its operability and permanence at the minimum interference with the legitimate activities and ultimate progress of the industry as a whole. He believed that thereby he was promoting the public good by advancing the stability necessary to continued expansion, and the freedom of distribution and installation, at minimum fair price, of products meeting the standards deemed essential by the best available consensus of public and industry opinion.

There has been no change in these principles nor in the policies based thereon.

In his practice in making them effective he has been guided by two considerations: (a) Whatever is accepted by the above-mentioned consensus should be freely available to the public, its employment or non-employment being dictated only by the economic conditions in effect, and (b) the interest of the public and of all elements of the industry is promoted by uniformity in local legislation throughout the country, since thereby the cost of production and distribution and the fair price to the consumer are decreased, and the probability of use increased.

He has at all times obtained and placed at the disposal of all of the industry elements the best available opinion, both industrial and legal, and will continue this practice.

The manufacturer divides regulatory legislation into five general classifications, as follows, and endeavors to secure participation by all elements of the industry in the treatment recommended for each:

1. Local ordinances or state statutes embodying provisions peculiar to the jurisdiction affected.

Recommendation: The presentation of model ordinances and statutes based upon the provisions of the National Electrical Code and the co-ordinated effort of all industry elements to forward the adoption of their essential provisions in the contemplated legislation.

2. Local ordinances or state statutes whose stated function is the protection of the public against unskilled installation through use of licensing procedure.

Recommendation: Presentation and co-ordinated support by all industry elements of model ordinances and statutes drawn with care to assure administration for the stated purpose, and to preclude perversion to special interest or ulterior motive.

The useful purpose which such legislation may serve in preventing incompetent and unsafe installation is recognized. Equally, there is recognized the possibility of manipulation to restrict installation and increase its cost.

Essential elements of such ordinances are believed to be (1) the constitution of an examining board on a basis assuring impartiality; (2) required meetings of the examining board at stated comparatively short intervals; (3) specific designation of the duties and powers of the examining board.

3. Ordinances and statutes conditioning the sale or offer for sale of electrical material on the approval of such material by the local authority having jurisdiction.

Recommendation: (1) The co-operative preparation and indorsement by all elements of the industry of a model "sales ordinance," the scope of which shall be limited to material deemed to embody essential hazard to the general public, and the co-ordinated promulgation thereof in each jurisdiction contemplating such enactment.

(2) The establishment of a single central agency for the determination of embodied fire and casualty hazard, so organized, equipped and operated as to assure general acceptance of its pronouncements.

The stated purpose of these ordinances is the protection of the public from the hazards inherent in inferior material and its sale or installation by unscrupulous agencies. While not wholly convinced of the need for general resort to enactment of this character, the manufacturer recognizes that it may serve a useful purpose if drawn with the understanding that it is limited to consideration of public safety and is intelligently administered.

4. Local ordinances or state statutes of restrictive intent, limiting installation, materials and methods in greater degree than is deemed essential by competent opinion.

The manufacturer deprecates the enactment of legislation of this character, believing it to be contrary to the ultimate interest of the industry. He believes that, public safety considered, economic considerations rather than

opinion should dictate the material and character of installation.

5. State statutes, eliminating or limiting the right of utilities to merchandise.

Properly co-ordinated with other agencies of distribution, the utility renders essential service in expanding the utilization of electrical devices and appliances to the ultimate advantage of the public as well as that of all industry elements. Until such material has achieved that degree of public acceptance which makes possible its "over-the-counter" sale, no other agency has the same interest in, nor can provide the facilities for, its promotion to the public at economic price. Recognition of this fact should result in complete and active co-operation of all industry elements in opposing such legislation.

The foregoing constitutes a statement of the past and present attitude of the electrical manufacturer, and it is believed that this attitude is soundly based and is in the ultimate interest of the industry. Despite this belief, there is no hesitancy in assuring careful consideration of any constructive criticism by any industry element or of willingness to enter into discussion with any industry element on the matters herein included.

"Yes" or "No"

"WE SHOULD all be very careful when we say 'no' to a suggested improvement or plan made by a subordinate. A 'no' in most cases is final. There is no appeal from it. On the other hand, if we say 'yes' the matter usually comes up for review by other superior officers, which gives such suggestion the advantage of having several officers review it.

"We are usually more careful when we say 'yes' because we know that our 'yes' decisions will have to stand the test of performance or further approval. As a matter of fact, we should be more careful with our 'noes' for the very reason that they do not have to stand the test of performance or further approval."

From a talk by

A. W. ROBERTSON,

Chairman of the Board, Westinghouse Electric & Manufacturing Company, before a group of officers of the Westinghouse Company at Pittsburgh, Pa.

▼ ▼ ▼

Canadian Power Census Shows Increase

Detailed results of the Canadian census of central electric stations for 1930, just published, show an increase of revenue for that year, compared with 1929, amounting to 2.7 per cent. Energy output increased 0.7 per cent, number of customers 3.3 per cent. Only a small portion of the increase in revenue came from domestic sales, and the gain in this item taken by itself was only 1.5 per cent. Gains in commercal lighting and power cannot be separately determined because of changes in classification. The table gives the statistics as published by the Dominion Bureau of Statistics.

While most of the quantities, physical and financial, increased from 1929 to 1930, the effect of adverse conditions is manifest in characteristic ratios. Average net revenue per kva. of generator rating was $28.17 in 1930, $30.36 in 1929; revenue per domestic customer $25.90 and $26.02; kilowatt-hours per kva. 3,913 and 4,289; revenue per kilowatt-hour 0.70 cent and 0.68 cent, a slight increase.

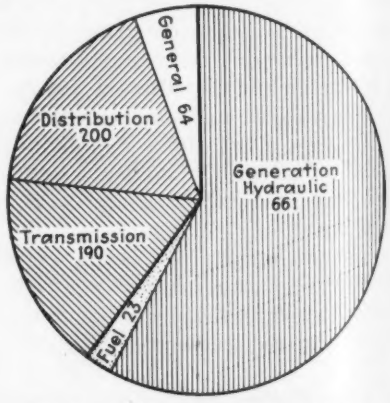
Certain unit quantities show an extraordinary range when different parts of the country are compared, apparently as a result of local conditions. For example, while the output for Canada as a whole was 50 per cent of capacity, it varied from 10.2 per cent in Prince Edward Island to 56.1 per cent in Ontario and slightly less, 52.6 per cent, in Quebec. Average revenue from domestic and farm customers, 2.29 cents per kilowatt-hour for the country, ranged from 1.10 cents in Manitoba to 9.62 cents in Prince Edward Island.

For other data, especially those relating to the individual provinces, the report itself should be consulted. The latest corresponding government statistics for the United States are those of the census of 1927. More recent figures, compiled by the ELECTRICAL WORLD, appeared in the issue of January 2, 1932.

Summary of Canadian Power Census

	1930	1929
Capital	$1,138,200,016	$1,055,731,532
Revenue from sale of energy:		
Total	126,038,145	122,883,446
Domestic service	34,114,680	33,627,863
Commercial light	20,618,891	23,303,726
Power (small)	4,875,661	
Power (large)	61,842,340	61,560,330
Street lighting	4,586,573	4,391,527
Expenses	74,209,469	67,432,418
Expense for salaries and wages	27,287,443	24,831,821
Number of employees	17,857	16,164
Electric power plants, number	587	585
Hydraulic	311	300
Fuel	276	285
Prime mover, hp.	5,401,108	4,925,555
Water	5,144,109	4,718,927
Steam engines	22,861	26,103
Steam turbines	$207,364	$156,873
Internal combustion	26,774	23,652
Generators (main), kva.	4,474,865	4,048,019
A.c., kva	4,468,513	4,041,178
D.c., kw.	6,352	6,841
Energy (thousands kw.-hr.):		
Generated	18,093,802	17,962,515
Domestic service	1,489,575	.....
Commercial light	744,126	.....
Power, street lighting free service and losses	15,860,101	.....
Customers, total	1,607,766	1,555,883
Domestic service	1,317,324	1,292,481
Commercial light	238,847	*233,854
Power (small)*	24,836	28,001
Power (large)	25,150	
Street lighting	1,609	1,547

*Small power included with commercial light in 1929



Investment in Canadian light and power industry—total, $1,138,200,016

Figures on chart: millions of dollars.

Analysis of Rural Line Costs

A survey of more than 700* miles of rural distribution line built in New York during 1930-1931 has just recently been analyzed by the electric technical committee on construction standards and costs of rural distribution, Empire State Gas and Electric Association.

While individual companies have previously analyzed their own costs, this Empire State survey is believed to be a pioneer attempt to make a statewide analysis of a much-debated subject for the information of member companies.

By its segregation of costs and consideration of influencing factors, the committee has very ably explained why a wide divergence in unit costs can justifiably exist.

It cites factors outside the control of companies which may have more to do with variations in cost than the design or construction methods employed. It suggests questions which should be answered whenever anyone claims to have built a "low-cost" line.

Sections of this report will be published in installments, the first of which follows. Conclusions should be delayed until all related factors have been presented.

If this excellent example of the Empire State is duplicated in every state, the fog of misunderstanding regarding distribution costs may be more quickly dissipated.—EDITORS.

FROM the data furnished by various companies the committee has been able to analyze the costs of more than 700 miles of rural line built in New York State during the past two years. These data have been tabulated by districts in an accompanying Table I. The figures for each district cover several extensions considered typical for that district. The total number of extensions was 457 and the average length 1.54 miles. These extensions are representative of construction work in all parts of the state in different types of country, under different weather conditions and at various distances from construction headquarters. The number of miles analyzed represents about 35 per cent of the normal rural line construction program in New York State for one year.

Conditions encountered in building rural lines are so extremely diverse that cost comparisons are prone to be misleading and valueless. As some common denominator is necessary, however, for the purpose of discussion, the mileage basis is used generally throughout this report, although for a more detailed analysis for certain items and to show the danger of drawing definite conclusions from mileage figures unit costs have also been developed on the per pole and on the per customer basis.

The weighted average cost of the primary and secondary line construction, exclusive of transformers, services and meters, for the 701.8 miles of line analyzed was found to be $1,430.40 per mile. The corresponding total cost per mile, including transformers, services and meters, was $1,806 per mile.

As a result of conditions encountered, lines built to the same general specifications varied greatly as to cost, particularly when compared on a mileage basis. One of the 457 extensions analyzed in this study cost at a rate of $2,699 per mile for the line itself, without transformers, services and meters, while another, built according to the same general specifications, cost at a rate of only $927 per mile. Here is a variation from low to high of nearly 300 per cent due to conditions over which the company building the line had no control.

Table II shows the variations that exist in the cost of lines on the mileage basis. The average number of customers per mile for the 701.8 miles of line was 5.1. The weighted average cost of $1,430 per mile, excluding transformers, services and meters, represents, therefore, an investment of about $280 per customer in excess of the normal investment per customer in the urban centers. Similarly, the weighted average total cost of $1,806, including transformers, services and meters, represents an investment of $354 per customer.

Right-of-Way and Clearing—Obviously, this item will vary for each job, depending on the conditions encountered. For the extensions studied, it varied from zero to $124 per mile, but the committee knows of instances where it has amounted to $450 per mile.

Poles and Fixtures—Under this heading are included the cost of poles, guys, guy anchors, crossarms, insulator pins, braces, wire racks and miscellaneous hardware plus the cost of installation. These items aggregate about 55 per cent of the total cost, excluding transformers, services and meters.

The details of this item were analyzed on both the mileage and per pole basis. On the mileage basis the cost of poles and fixtures varied from $552 to $1,088 per mile, a variation of 97 per cent from the low, but on the per pole basis the variation was from $21.80 to $49.50 per pole, a variation of 123 per cent from the low. The character of the soil, of course, affects the cost of digging the holes and might easily be responsible for most of this difference. The figures, however, show the effect that span lengths governing the number of poles per mile have on this most important item and show also the danger of comparing mileage costs without going further in order to discover the details which are responsible for these costs.

The average cost of labor and material for the poles and fixtures was $38 per pole. The cost of the poles alone at the company's pole yard accounts for about one-third of this figure, which means that the poles alone represent about 20 per cent of the cost of the entire line, excluding transformers, services and meters.

In New York State, since the chestnut has been

**Represents about 35 per cent of the normal rural building program in New York State for one year.*

destroyed by the blight, there is no native timber available for poles of the quality required. The companies are, therefore, having their poles shipped in from other parts of the country. They are using chiefly Western red cedar and Southern pine. The freight alone amounts to more than the cost of poles delivered at the job in the parts of the country from which these poles come.

Farm Labor—It has sometimes been suggested that farm labor might be employed with profit to both the farmer and the company in the construction of rural lines and, in fact, this practice is followed in many cases. Ordinarily, the farmer is employed only for digging the pole holes, the cost of which averages about $4.50* per pole or $90 to $100 per mile. If, as is usually the case, the farmer is paid in cash for his services, there is little, if any, saving in the cost of the line. The advantage of the plan is that it gives the farmer some ready cash with which he can buy appliances to use the service when installed. Whether the farmer is paid in cash or otherwise, the cost of this labor must be recognized when comparing cost figures.

Spans—Since the cost of poles and guys in place is the largest single item in the total cost, it is urgent that the maximum span consistent with safe construction be used. Much has been done with regard to both the materials and installation specifications to make longer spans possible. A notable example of this has been the use of steel-cored aluminum conductors. There are, however, many factors over which the companies have little control that limit the maximum allowable span. The sleet and wind loadings of the area, the number and the degree of the curves in the road followed by the line, its contour and the number and the location of customers are all factors over which there is little or no control. The necessity of joint construction with telephone companies in some cases is also a factor which causes a reduction in the allowable span length.

On the 701.8 miles analyzed, figures were available which show that the average span obtainable was 245 ft. even though the lines were built to specifications that permitted spans of 300 to 330 ft. This indicates the extent to which actual field conditions influence the factor that has the greatest effect on the mileage cost.

As might be expected, the average span of the most expensive line in the above group was only 187 ft., while the average span of the least expensive line was 250 ft.

Joint Use—There is a definite need for joint construction with telephone companies in urban distribution, but it is in general a questionable practice in rural areas. The requirements of the telephone companies will usually force the use of shorter spans, so that even though pole ownership is divided equally between the two companies, there will be more poles and usually of a larger and more expensive type. Instead of cutting the pole and fixture costs in half, as might be expected, joint construction may actually result in an increase in costs to the electrical utility.

However, in some locations telephone line construction has preceded the electric line construction. Right-of-way and tree trimming difficulties also will occasionally prohibit two separate pole lines, in which case joint construction is almost necessary regardless of economy. Under certain conditions, the telephone companies will construct jointly with maximum spans of 250 ft., and where these possibilities arise that is usually the most economical practice to follow.

Conductors and Insulators—Under this heading are included the cost of wire, both primary and secondary,

**Average of making and filling holes in medium hard and rock ground, weighting 45 per cent, 40 per cent and 15 per cent respectively.*

Table I—Rural Lines Cost Data, New York

Voltages 2.3 Kv. — 4.6 Kv. — 6.6 Kv.

District Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Miles of line analyzed	27.2	12.87	12.74	32.21	11.32	17.0	8.73	16.93	41.73	24.79	4.94	31.44	38.0	39.64	16.3	50.31	5.7	6.67	4.33	28.08	17.84
Number of lines analyzed	11	15	15	20	14	14	6	9	27	11	8	19	13	29	17	46	4	5	3	6	7
Length per line analyzed (avg.)	2.49	1.1	1.1	1.61	1.2	1.21	1.5	1.88	1.5	2.25	0.62	1.7	2.92	1.36	1.0	1.1	1.42	1.33	1.1	4.69	2.55
Conductor specifications	2-1A*	2A*	2-4A*	2-1A*	2-4A*	2A*	2A*	4A*	2-4A*	2A*	2A*	2-4A*	2A*	2A*	2-4A*	2-4A*	2A*	2A*	2-4A*	2A*	2A*
Pole specifications	B*	C*	C*	B*	C*	C*	C*	D-C*	C*	E*	C*	C*	C*	C*	C*	C*	C*	D*	C*	D*	C*
Average span (ft.)	288	234	209	295	236	259	268	229	215	327	237	202	336	244	225	200	216	255	207	304	254
Average pole length (ft.)	35	30–35	30	35	30	30–35	30–35	35–40	30	35	30–35	30	40	30–35	30	30	30–35	35	30	35	30–35
Total customers	121	56	84	177	74	89	53	70	207	130	26	200	137	185	88	304	29	25	36	114	121
Customers per mile	4.3	4.4	6.7	5.5	6.5	5.2	6.1	4.13	4.9	5.25	5.3	6.4	3.61	4.7	5.5	6.0	5.1	3.75	8.7	4.05	6.5
Transformers per mile	2.92	2.3	2.6	3.5	2.0	2.2	2.5	2.36	1.9	2.95	2.6	2.0	2.79	2.2	2.2	1.8	2.4	2.69	1.8	1.85	2.0
"M" ft. wire per mile	12.6	12.1	17.3	11.9	11.8	14.8	12.9	13.1	14.8	12.6	14.8	14.0	11.3	13.8	15.1	12.0	20.0	12.7	15.2	14.10	20.0
Costs per Mile (Dollars)																					
Right-of-way and clearing	$44	57	2	92	5	45	13	0	2	65	68	4	78	107	10	0	73	72	5	124	60
Poles and fixtures	713	910	791	690	812	911	737	1088	659	582	722	552	632	985	738	694	964	677	878	642	791
Conductor	452	500	519	400	405	502	496	496	435	379	474	380	387	500	451	231	860	351	484	522	607
Overhead charges	241	177	179	141	166	131	92	190	149	164	190	127	120	159	162	126	189	165	186	206	117
Total (primary)	1450	1644	1491	1323	1388	1589	1338	1774	1245	1190	1454	1063	1217	1751	1361	1051	2086	1265	1553	1494	1575
Transformers and installation	208	203	165	260	150	248	224	200	121	257	278	368	208	222	149	166	166	269	173	225	178
Services and installation	52	46	66	65	65	66	7	71	49	52	55	64	49	35	54	60	27	60	83	75	44
Meters and installation	48	48	67	60	66	56	77	59	50	69	54	64	48	51	55	61	50	68	84	80	80
Overhead charges	28	24	26	52	25	21	44	36	19	62	59	43	34	31	23	25	41	58	30	44	23
Grand total	$1786	1965	1815	1760	1694	1980	1690	2140	1484	1630	1900	1602	1556	2090	1642	1363	2370	1728	1923	1918	1900

A*= A.C.S.R. B = Chestnut "B." C = Western red cedar. D = Southern pine. E = Southern pine "B."

insulators and the cost of installation. This item varies with the pole spacing and with the number and location of customers.

Obviously, the shorter the span the more poles there are to be climbed and the more wire ties to be made. Joint use of poles also tends to increase the unit cost when figured on mileage basis, not only on account of the shorter spans, but also as more care and more time are required in order to avoid foreign attachments and wires when pulling the new conductors.

The number and location of customers directly affect the amount of secondary wire required and therefore have a decided bearing on the mileage cost of this item.

The fallacy of attempting to compare costs on any predetermined basis is well illustrated by the figures on two lines included in the group studied. There is a variation of nearly 100 per cent on the conductor costs of the two lines on the mileage basis. On the per pole basis, however, the conductor cost of one is $22.90 per pole, as compared to $23.71 per pole for the other, a very slight difference. On the other hand, the cost of the conductors on a per customer basis is $300 for one line, as compared to $94 per customer for the other.

Practically all of the lines built were single phase, two wire, which means that approximately 10,560 ft. of primary wire was required per mile. However, the amount of wire actually used per mile was found to be 13,500 ft., which means that there was an average of 2,940 ft. of secondary wire per mile. The secondary wire amounted, therefore, to 22 per cent of the total wire installed. With an average of 5.1 customers per mile, the 2,940 ft. of secondary wire represents approximately 576 ft. of secondary per customer.

Overhead Costs—Overhead costs include such items as compensation and public liability insurance, general engineering, stores expense and interest during construction. Some companies allocate many of these items direct to labor and material, but to such extent as was possible in the preparation of the above table and for the purposes of discussion, they have been eliminated from labor and material costs and segregated in this item of overhead costs, (a) as applicable to the line, exclusive of transformers, services and meters, and (b) as applicable to transformers, services and meters.

General engineering will vary considerably. Some jobs will be burdened with heavy charges due to special engineering necessary in connection with railroad crossings, canal crossings, attachments to state highway and railroad bridges, etc. Fees for special attachments are also included in this item. Stores expense is charged

Table II—Variations in Conditions and Unit Costs

The column headed "All Lines" is the summary of the tabulation in Table I, to which reference should be made. The "Maximum Cost Line" is one of the 30 extensions in district No. 25 and the "Minimum Cost Line" one of the 46 extensions in district No. 16.

	All Lines	Maximum Cost Line	Minimum Cost Line
Miles of line	701.8	1.09	1.37
Number of extensions	457	1	1
Average length of extension	1.54	1.09	1.37
Number of poles per mile	21.6	31	21.1
Average span, ft.	245	170	250
Customers per mile	5.1	2	2.2
Conductor per mile, ft.	13,500	16,500	12,000
Transformers per mile	2.2	1	2.2
Cost Per Mile			
	Average		
Right-of-way and clearing	$50.42	$50.46	0
Poles and fixtures	784.51	1,400.00	$551.76
Conductors	437.80	741.30	264.00
Overhead costs	157.67	507.30	111.24
Total (primary and secondary)	$1,430.40	$2,699.06	$927.00
Transformers and installation	220.50	*107.00	177.95
Services and installation	58.50	26.00	21.80
Meters and installation	59.03	24.00	22.08
Overhead costs	37.80	18.84	19.26
Grand total	$1,806.23	$2,874.90	$1,168.09

* One 3-kva. transformer.

Table III—Distribution of Costs on 485 Miles of Line in New York State

Item	Total Labor and Material: Cost Per Mile	Total Labor and Material: Per Cent of Cost Per Mile	Labor: Cost per Mile	Labor: Ratio of Labor Cost to Total Item	Labor: Per Cent of Total Cost per Mile	Material: Cost per Mile	Material: Ratio of Material Cost to Total Item	Material: Per Cent of Total Costs per Mile
Right-of-way and clearing	$70.00	3.7	$70.00	100.0	3.66	.....	....	.....
Poles and fixtures	827.00	43.2	366.36	44.3	19.15	$460.64	55.7	24.06
Conductor	474.33	24.7	153.75	32.4	8.03	320.58	67.6	16.70
Overhead charges	165.03	8.6	79.23	52.0	4.10	85.80	48.0	4.50
Total (primary and secondary)	1,536.36	.....	.....	.....	.....	.....	....	.....
Transformers and installation	226.00	11.8	26.00	11.5	1.36	200.00	88.5	10.45
Services and installation	60.00	3.1	20.00	33.3	1.04	40.00	66.7	2.10
Meters and installation	60.00	3.1	20.00	33.3	1.04	40.00	66.7	2.10
Overhead charges	32.44	1.8	16.87	52.0	0.90	15.57	48.0	0.90
Total	$1,914.80	100.0	$752.21	.....	39.2	$1,162.59	....	60.8

...York ...te Companies, 1930-1931

23	24	25	26	27	28	29	30	31	32	33	Totals and Averages
11.55	32.7	48.1	4.4	20.4	36.16	2.92	28.94	11.57	8.8	16.2	701.8
6	37	30	4	10	16	4	15	14	3	13	457
1.93	0.9	1.6	1.0	2.04	2.25	0.7	1.93	0.83	2.9	1.25	1.54
2A*	2-4A*	2A*	2-4A*	2A*	2A*	2-4A*	2A*	2A*	2A*	2A*	2-1A*
C*	C*	D-C*	C*	C*	C*	C*	C*	C*	C*	C*	D-C-B*
268	205	226	230	265	321	240	263	242	241	259	245
30-35	30	35	30	30-35	35	30	30-35	30-35	30-35	30-35	30-35
51	131	168	20	139	190	16	177	69	27	75	3585
4.4	4.0	3.47	5.0	6.8	5.27	5.0	6.1	5.6	3.0	4.6	5.1
2.8	2.0	1.97	2.0	2.5	2.16	2.0	2.2	2.4	2.5	2.8	2.2
11.4	13.0	13.8	12.8	13.0	11.9	11.8	14.6	14.9	13.0	16.0	13.5
											Weighted Average
4	24	106	0	94	8	0	87	100	9	11	50
722	770	930	827	822	656	739	932	911	681	788	785
401	321	546	406	458	451	512	502	576	369	403	438
112	149	269	168	137	133	170	167	190	145	156	157
1239	1264	1851	1401	1511	1248	1421	1688	1777	1204	1358	1430
284	320	249	156	252	194	167	275	183	185	217	220
29	40	59	48	94	95	54	69	53	58	42	59
33	40	36	49	60	55	55	58	55	31	46	59
35	35	70	24	48	52	24	55	42	23	42	38
1620	1699	2265	1678	1965	1644	1721	2145	2110	1501	1705	1806

by some companies direct to materials, while by others it is included in overhead costs.

Where detailed analysis of this item was possible, it was found to range from 7½ to 15 per cent, with a general average of 11 per cent, of the total cost, including transformers, services and meters.

Transformers, Services and Meters—These items vary with the number of customers, the capacity of the customer's installation and the location of the customers. The weighted average cost of the three items, transformers, services and meters, including their share of overhead costs, for the 701.8 miles was $376 per mile and $73.70 per customer.

Detail Cost Distribution—The committee was in possession of sufficient detail on 485 miles of the 701.8 miles of lines to make accurate division of costs between labor and material and to show the relation between each item and the total cost of a weighted average mile of 485 miles of lines. This analysis is given on the basis of percentages in Table III.

It is interesting to note that the poles and fixtures cost accounts for 43.2 per cent of the total line cost. It amounts to about 54 per cent of the primary line cost. The material in this item, which is mostly poles, accounts for about 24 per cent of the total cost and about 30 per cent of the primary line cost.

Construction Standards—The costs of rural lines which have been discussed should be considered only in the light of the construction standards used in this state (which will be outlined in a later article).

Data were furnished to the committee by utility companies operating in Alabama, Georgia, Illinois, Maine, Michigan, Pennsylvania, Vermont and Virginia. The figures given show no departures (which are not easily explainable) from those in New York State.

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READERS' FORUM

Claims Constant-Tension Reel Drives in 1921

To the Editor of the ELECTRICAL WORLD:

In the first paragraph of the article on "New Electric Reel Drive Maintains Constant Tension," appearing on page 316 of the September 3 issue, the following statement is made:

"The slipping clutch has held this field for a considerable length of time, not because it is entirely satisfactory, but because until now there has been nothing better available."

This statement is a bit misleading, since Westinghouse engineers in 1921 co-operated with the electrical superintendent of the Superior Steel Corporation in developing a successful strip reel drive. The Westinghouse company has successful drives of this nature operating in various steel mills in the Cleveland and Pittsburgh districts, the total number of such drives being approximately thirty.

Several years ago the writer published an engineering article describing the constant-tension reel drives and has repeatedly made reference to such installations in various articles summarizing electrical developments in the steel mill industry.

D. W. DEAN,
Manager Control Section.
Westinghouse Electric & Manufacturing Company,
East Pittsburgh, Pa.

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World Needs More than Enlightened Self-Interest

To the Editor of the ELECTRICAL WORLD:

It is hard for me to account for such a paradoxical heading as "Let's Have Some Intelligent Selfishness," used in your editorial of September 3. There is no such animal. Intelligent self-interest there may be, although enlightened would seem more appropriate, but intelligent selfishness never, because selfishness and intelligence, like the irresistible force and the immovable mass, can never exist simultaneously.

One can guess that your main thought was the necessity for frankness, but just why you should find it necessary, in developing that idea, to word your editorial in such a way as to cast doubt on the genuineness of the altruistic motives of co-operative efforts and to recommend a super-selfish philosophy which is absolutely void of altruism is not so apparent.

Might one be allowed to recommend a more intensive study of altruism in the concrete, but with some particular attention to a problem in the abstract, namely, that of trying to visualize the jungle which would develop in a world as absolutely void of altruism as is the philosophy you recommend?

In any study of conduct the important factors are, to quote your own words, "the motive behind the plan and the spirit back of its execution." The reason that the motive is important is due to the fact that many people believe that the end justifies the means. Such people are quite willing to sacrifice fundamental principles in order that the plan may succeed. "To do a great right do a little wrong" is their motto. "Honesty is the best policy" is a maxim handed down through the centuries, but one is really honest only if one's motive is honest. One's confidence in a man whose honesty is prompted merely as a matter of policy would be tempered by the disquieting thought that he might suddenly decide that some other policy was better than that of honesty. In truth, it is due to sad experience with individuals of that breed which has produced the skepticism, which is apparent, in "this practical bread-and-butter world." Similar experience has produced a similar skepticism with regard to altruism, but, "Allah be praised," we still have altruism unadulterated and honesty undefiled, more or less. The fact remains that we could not get along without either.

May one also be permitted to add that the more we practice both the sooner will we reach a solution of the difficulties which have been brought about largely through the practice of an ignorant selfishness which can conceive only that the function of business is to produce profits, whereas actually, the profits are merely an apparently necessary incidental to the process of supplying a need, or giving service, which in reality is the true function of business.

R. G. MATTHEWS.

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Men of the Industry

FRED A. MATTHEWS, for ten years executive vice-president, has been elected president of the Tidewater Power Company to succeed A. W. Higgins, resigned, the directors announced, because of other business connections. The position of executive vice-president was abolished.

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R. A. PHILLIPS, for a number of years assistant to President Frank Milhollan of the Central West Public Service Company, with headquarters in Omaha, has been promoted to the position of executive vice-president in charge of operations.

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M. SCHILLER, in addition to his duties as vice-president of the Superheater Company of New York and Chicago, has been elected treasurer of that company, to succeed W. F. Jetter, recently resigned. F. J. DOLAN was elected assistant secretary and assistant treasurer of the company. THOMAS F. MORRIS was elected treasurer and assistant secretary of the Superheater Company, Ltd., of Montreal, to succeed Mr. Jetter.

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V. H. MOON, sales manager of the Pacific Power & Light Company, Portland, Ore., since 1931, has resigned to accept a position with the receivers of the Middle West Utilities Company, Chicago, as director of commercial activities. In this capacity he will supervise the commercial development of each of the operating subsidiaries in that group. The early stages of his career were spent with H. M. Byllesby & Company, but after the war he entered the employ of the Pacific Power & Light Company, serving as meter tester, chief clerk and district manager, until in 1922 he was brought into the Portland office to supervise the company's appliance selling activities. In January, 1931, he was appointed sales manager and given the broader responsibility of directing the general commercial development of the company.

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DR. R. H. MARVIN has become laboratory engineer for the Doble Engineering Company with headquarters at Medford Hillside, Mass. Dr. Marvin was educated at Stevens Institute of Technology and from 1903 to 1914 was employed by the General Electric Company, chiefly in association with the late E. E. F. Creighton in the productive apparatus department and later in the consulting engineering department. From 1915 to 1925, with the exception of a year's absence in the radio development department of the U. S. Signal Corps, he was with R. Thomas & Sons Company, manufacturers of electrical porcelain at East Liverpool, Ohio. Since 1925 he has been at Johns Hopkins University and for the past six years was engineering research fellow, working on insulating materials under Dr. J. B. Whitehead, where he received his doctorate in 1928.

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J. S. Tritle New President of N.E.M.A.

J. S. Tritle, vice-president and general manager in charge of the manufacturing, sales and engineering operations of the Westinghouse Electric & Manufacturing Company, was elected president of the National Electrical Manufacturers' Association at the recent convention held in Rye, New York. An

outstanding figure in the electrical manufacturing industry for some years, Mr. Tritle has spent practically his entire career with the Westinghouse interests.

Following graduation from Yale University he entered the electrical contracting business, in which he continued for eight years, and at the outset of the St. Louis World's Fair he accepted the position of chief of construction. It was at the close of the fair that he became identified with the Westinghouse company as manager of the Kansas City district, and when in 1915 the St. Louis and Kansas City offices were consolidated he assumed charge of both. In 1922 he was made manager of the merchandising department, a division of the general sales department of the company. So successfully did he perform the executive duties of this office that in 1925, when a separate department was made of the merchandising business, he was selected to be general manager of the merchandising department, directing engineering and manufacturing as well as sales work of that department, with headquarters in Mansfield, Ohio. Four years later he was called to the East Pittsburgh offices as vice-president in charge of manufacturing operations. Last year he was elected vice-president and general manager, in charge of manufacturing, sales and engineering operations. Mr. Tritle is also vice-president in charge of operations of the Westinghouse Electric Supply Company, wholesale distributor of Westinghouse products to electrical dealers, contractors and industrial establishments.

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JAMES L. MARTIN, senior accountant and auditor in the accounting bureau of the Public Utilities Commission of the District of Columbia, has been selected executive secretary to the commission to succeed Earl V. Fisher, resigned.

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MATTHEW S. SLOAN, formerly president of the New York Edison Company and affiliated companies, has been appointed chairman of the committee on federal expenditures of the United States Chamber of Commerce.

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NEWTON JACKSON, electrical engineer for the Virginia Public Service Company, Charlottesville, Va., has been transferred to the company's office at Alexandria, Va.

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F. J. RUDD has been appointed managing engineer of the motor department of the General Electric Company, it has been announced by N. J. Darling, manager of the River Works at Lynn, Mass. He succeeds L. E. Underwood, who has been made manager of the Pittsfield, Mass., works of the company.

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OBITUARY

CHARLES F. GOOB, at one time chief engineer of the Electrical Commission, Baltimore, later head of the Bureau of Mechanical-Electrical Service in the municipal government and more recently chief engineer of the city, died at a Baltimore hospital September 26 after a short illness. Mr. Goob was a member of the American Institute of Electrical Engineers, the American Association of Engineers and the American Society of Municipal Improvement.

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G. TRACY ROGERS, retired public utilities official and organizer of the Rutland (Vt.) Railway, Light & Power Company, died in the Rutland Hospital September 21 after a long illness. He spent eight years in the banking business before becoming identified with the street railway of Binghamton in 1899. Soon afterward he acquired additional street railways which were merged into the Bingham-

ton Street Railroad Company. From 1893 to 1903 he was president of the Street Railway Association of New York. In 1905 he began the consolidation of the People's Gas Light Company, the Rutland Street Railway Company, the Chittenden Power Company and the Rutland City Electric Company. These were merged into the Rutland Railway, Light & Power Company, which, in 1912, was sold to W. S. Barstow of New York. He was 78 years of age.

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HERMAN PLAUT, for 40 years an important figure in the gas and electric fixture industry in New York, died in the Hotel Endicott, New York, September 22, after firing a pistol shot into his heart. Mr. Plaut was president and director of L. Plaut & Company, Inc., vice-president and director of Black & Boyd, and treasurer and director of the Alexilite Company, all interlocking firms manufacturing and selling electric light fixtures. He was also a director of the Electrical Board of Trades and the Society for Electrical Development and was conspicuous in the drawnout labor disputes between electrical and building unions and electrical manufacturers and contractors. He was 60 years of age.

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CHARLES G. PERKINS, formerly president of the Arrow Electric Company, Hartford, Conn., died September 26 at his home in South Weare, N. H., in his eighty-third year. A pioneer in the electrical industry, Mr. Perkins organized the Perkins Electric Switch Manufacturing Company of Hartford, which later was sold to the Bryant Electric Company of Bridgeport. After five years he organized the Perkins Corporation, of which he was president. Later the name was changed to the Arrow Electric Company. Mr. Perkins continued as president until its merger with the Hart & Hegeman Manufacturing Company, at which time Mr. Perkins retired. He was the inventor of a certain type of carbon filament for electric lamps and he also manufactured the well-known Perkins incandescent lamp.

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HENRY WHELAND CATLIN, a vice-president of American & Foreign Power Company, Inc., and a vice-president, director and general counsel of Compañia Cubana de Electricidad of Havana, Cuba, died of a heart attack September 27 at his home in New York City. Mr. Catlin was born at Chestertown, Md., in 1874 and received his education at Washington College, Chestertown, and the University of Virginia Law School. He had had a wide business experience in foreign countries before joining the foreign department of Electric Bond & Share Company in 1916.

New Equipment Available

Solderless Tap and Service Connector

Solderless connectors for making tap and service joints in light and power distribution are announced by the Reliable Electric Company, Chicago. A slotted bolt type of connector with an improved contact clip is now available. The simple design applies all the pressure at two points under the face of the nut and insures an effectual clamping force without damage to the wires. The nut holds its shape and can be reused. Wires and strands are completely surrounded and cannot be forced out of position. With this design it was possible to make a clamp of a mechanically strong alloy and still keep the joint resistance less than that of an equal length of wire.

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Flow Meters Feature Direct Lever-Actuating Mechanism

Mechanical flow meters featuring a simple direct lever-actuating mechanism, by a large powerful float, by a pressure tight bearing with grease reservoir, by a series of range tubes that permit changing the range of the meter without disturbing the orifice and by a type of construction and assembly whereby the manometer may be taken apart and cleaned in the field without altering the calibration, are announced by the Brown Instrument Company, Philadelphia, Pa.

These are incorporated into a series so that this new flow meter may be obtained in a number of combinations, including square root and evenly divided charts; automatic planimeter, multipen, flow, pressure, temperature; compensation for pressure and temperature and automatic control and recording.

All recording models of this meter can be provided with either hand wound or electric chart drive, and either can be furnished in a variety of chart speeds. Control models in both the single and duplex forms have been developed. The control models operate mercury switches and will handle 15 amp. at 110 volts directly through the instrument without the use of relays.

The weight of the instrument has been reduced as far as is consistent with a working pressure of 1,000 lb., and it is portable in the sense that it can be carried from one job to another.

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THE COROX QUICK-COOK UNIT, built of stainless sheet steel parts for use in electric ranges, is announced by the Westinghouse Electric & Manufacturing Company. It heats more quickly than any previous unit, it is claimed. The pan, heater support and terminal straps are made of cold rolled steel and nickel plated. The heat unit is supported in the pan by four V-shaped supports and held rigid by a center stud and the four terminal posts.

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Complete Fixtures for Wall or Ceiling Surfaces

Architects, lighting specialists and electrical contractors can now secure a variety of built-in lighting effects from standard, ready-to-hang equipment installed upon the surface of the ceiling by the new Wakefield "Dominos" in combination or sets of three or more units. They are complete fixtures, applied to wall or ceiling surface. The individual unit consists of a plate with usual supports and pointed at both ends. On this plate are mounted two duplex sockets which accommodate lamps of from 55 to 100-watt sizes. Supported from the plate is a hinged and readily removable frame which carries a globe built up of nine pieces of flashed opal glass. They have been placed on the market by the F. W. Wakefield Brass Company, Vermilion, Ohio.

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AN ELECTRIC BULB which produces ultra-violet rays, known as the "Cosmos" ultra-violet lamp, is announced by the Cosmos Corporation, Newark, N. J. It operates on either direct or alternating current. It is manufactured in 60, 100, 150 and 300-watt sizes.

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NEW EXPOSED HOLOPHANE DENTAL UNITS, the lighting system of which consists of three polished cast aluminum units for atachment to the ceiling of an existing office and arranged in a triangle above the chair in such a manner as to direct intense illumination into the patient's mouth, are announced by the Holophane Company, Inc., New York. The intensity of the illumination is at least 250 foot-candles.

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MECHANICAL-DRIVE, NON-CONDENSING STEAM TURBINES for driving centrifugal pumps, fans and other rotating equipment are announced by the General Electric Company. They are suitable for driving equipment at speeds from 1,200 to 4,000 r.p.m. and are available up to 250 hp. under suitable steam conditions. These machines are single stage with two rows of revolving buckets.